

TERRA

THE NATURAL HISTORY MUSEUM OF LOS ANGELES COUNTY

VOL. 21, NO. 4/SPRING 1983

*East African Mammals:
Wildlife Portraits by
Jonathan Kingdon*



FROM THE DIRECTOR



Dr. Craig C. Black

For many months now we have heard a growing public clamor about the state of science education in our society. Congress has been concerned about government's role in enhancing science education in secondary- and college curricula. We are told of declining mathematical abilities of graduating high school seniors as reflected in college entrance examinations, and the decline of science literacy has been featured in our weekly news magazines and in the daily press.

Science News (February 12, 1983) reports that new federally funded programs in the National Science Foundation will seek to improve the teaching of science and mathematics in grades six through twelve by recognizing and rewarding outstanding high school teachers in these subjects. The NSF program, or a similar program in the Department of Education, will also provide partial funding for training teachers to improve their science teaching skills.

There has at times been heated debate as to whether the responsibility for enhancing science education lies at the federal or local levels. Fortunately, it now appears that a partnership is evolving with the federal government supporting efforts to improve science education in concert with local and state initiatives.

Unfortunately, most of the debate and concern has centered on the decline in mathematical skills, not on the broader aspects of science education, and it has centered on performance, not on basic understanding of science and scientific method. I say unfortunately because we live in a society that is profoundly confused about what science is, how scientists work, and the difference between science and technology. As more and more people know less and less about science and how it is pursued, we have a

more skeptical, uneasy and, at times, fearful public.

While our primary and secondary schools have a central role to play in the teaching of mathematics, a skill essential to everyday life as well as to the pursuit of scientific careers, they must also educate students who will never be scientists but who must understand what science is and what scientists do. Without general public understanding, we can only expect a continuing decline in public support for scientific endeavors. Here, I believe, science museums can and should also play a critical role.

Museums have long considered themselves educational institutions. We are known for "school tours," where literally hundreds of thousands of primary and secondary school students are exposed to museum education classes every year. In the past such tours or classes were all too often "exposure," not teaching — an event, not an educational experience. However in the last decade museum tours have increasingly become true educational experiences, with content — not coverage of everything in the exhibit halls — being stressed.

While the schools can and must teach an understanding of science and must develop the requisite skills for those students who wish to undertake scientific careers, museums have the opportunity to teach the how, what, and why of science. Students can participate in the process of observation, the formulation of tentative statements, or hypotheses, based upon these observations, and the testing of these hypotheses through prediction. They can discover the immense complexity of the organic world and how it differs from the simpler nonliving systems of physics and chemistry. Utilizing museum exhibits and collections, they can be brought into the process of science. Mathematics lends itself to the classroom, biology, chemistry, and physics to the laboratory. What better laboratory than a museum of natural history or science and technology?

Students must learn that science is the discoverer, the pursuer of knowledge, the elucidator of the principles of our universe. Science is not technology, but without science there is no technology. Technology is the application of scientific discovery for the use and, ideally, the benefit of man. The atomic isotope uranium-235 occurs in nature, its atomic structure and properties are known scientific facts. Of all the several hundred known atomic isotopes, U-235 is the only one that is spontaneously fissionable. This information lies in the realm of scientific discovery; the application of this information to the development of nuclear power plants for energy use lies in the realm of technology.

Science tells us that natural ecosys-

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THE MEMBERS MAGAZINE OF
THE NATURAL HISTORY MUSEUM
OF LOS ANGELES COUNTY
VOL. 21, NO. 4/SRING 1983



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Lesser kudu (*Tragelaphus imberbis*),
drawn by Jonathan Kingdon. Selections
from Kingdon's work will be on exhibit
at the Natural History Museum this
summer.

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Printed by North Hollywood Printing Co., Inc.

Color separations by Digital Dot

Typography by RS Typographics

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ISSN 0040-4144

Eye | Stripe and | and Pencil | Horn

by JONATHAN KINGDON



The environment in a zebra herd is optically dazzling.

Jonathan Kingdon is the author of the seven-part magnum opus, *East African Mammals: An Atlas of Evolution in Africa* (Academic Press, 1971 to 1982). The book, which is 3,000 pages long, contains an authoritative account of the ecology, social organization and behavior of each of East Africa's more than 420 mammal species. The text is accompanied by 2,000 drawings, all done by Kingdon, showing the range of form, posture and expression of each of his animal subjects. The illustrations are a delight to those interested in animals, and the book, which has been called a classic contribution to East African

mammalogy, is as entertaining as it is informative.

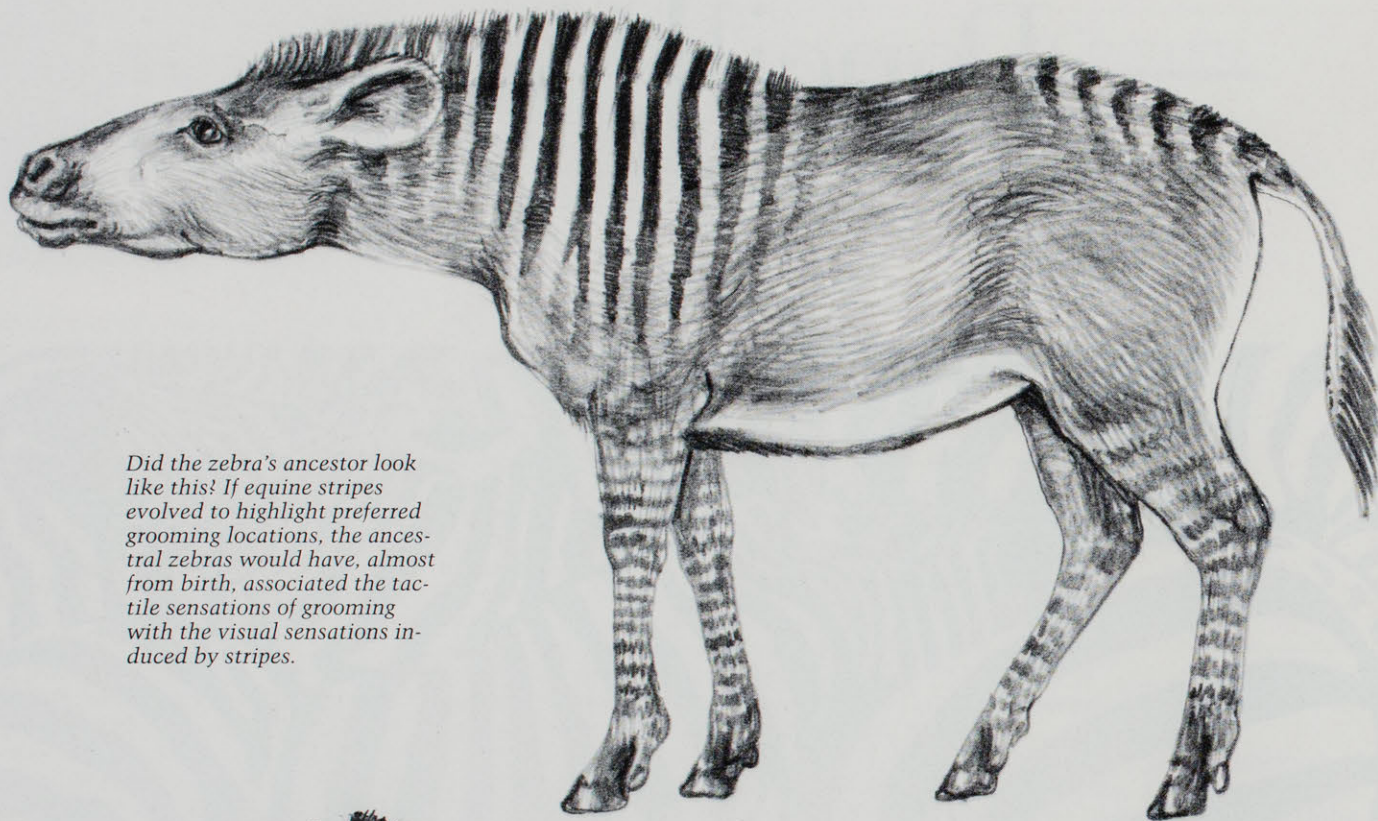
Kingdon is an artist as well as a naturalist, and his work has been featured in some twenty exhibitions in Africa, Europe and Japan. From June 14 to September 11, 175 of his drawings will be on display in the Natural History Museum, in the first exhibition of his work in America.

Technology has developed some wonderful new tools for the field biologist to use: the cross-country vehicle, microtransmitters for radio tracking, activity and physiological

sensors, immobilizing drugs in darts fired from special bows, blowpipes or guns, sophisticated trapping systems, infrared binoculars, various forms of remote control camera or recorder, and ultrasound detectors. All these tools have vastly increased what we can learn about the private lives of animals.

I knew nothing of this when I started work, in the mid-1960's, on an inventory of East Africa's mammalian fauna. My tools were a notebook and pencil, a curious eye and a good pair of legs. Unencumbered, I could devote my time to watching, drawing and asking the most elementary questions. Why was the animal the shape, color and size it was? Why

One of the most absorbing of my journeys began with that childish query: why the zebra's stripes?



Did the zebra's ancestor look like this? If equine stripes evolved to highlight preferred grooming locations, the ancestral zebras would have, almost from birth, associated the tactile sensations of grooming with the visual sensations induced by stripes.



Common zebra, *Equus quagga*

was it where it was? What was the significance of what it was doing? The information that I assembled was augmented by the literature, and the notebook/sketchbook/scrapbook format remains detectable in my completed book.

At the time I began, there was no basic text or reference book devoted to this wonderful array of mammals. This is surprising in that East Africa is the richest region in the world in number and variety of mammal species. This richness attracts hundreds of thousands of tourists, and there was no shortage of books on hunting big game for sport. But the first sustained studies of individual species and ecosystems did not begin until the 1960's.

I suspect that a primary reason for the lack of basic texts may have been the daunting number of species. One needs to be a storekeeper to maintain interest in simple lists of species, and in this case the number is well in excess of four hundred. Likewise, morphology, distribution, habitat and habits can be a bore

when reduced to codified catalogues.

What then has sustained my interest in this variety of animals?

First there is simple delight in watching living things going about their business: I remain an old-fashioned naturalist. The naturalist's delights are augmented by a barrage of intriguing questions that come to mind whenever one watches animals. Sophisticated tools may be essential for the detailed study of a species, but I found them a distraction in my work. My subjects ranged across the entire spectrum of mammals, and I never knew what I would see next; thus I never even carried a camera.

The use of almost any tool or technique invites specialization, especially when a particular discipline has pioneered its development. Continually I had to resist the temptation to become involved with a particular species or a particular facet of biology and to remind myself that the project had to encompass hundreds of species and a whole gamut of disciplines.



Grevy's zebra (Equus grevyi) is the most evenly striped of the three East African species of zebra; it also has the least exclusive social relationships. It is possible that the vivid striping of the zebras has emancipated them from the elaborate grooming rituals used by many other aggregating mammals to ease social tension.

The unifying factor, and the most sustaining concept guiding the writing of the book, was my central interest in evolution. A uniquely rich fauna raises fundamental questions: Why so many? And why here? Evolution is the only context in which these and innumerable other topics can be meaningfully discussed. No aspect of animal biology is without its evolutionary dimension, and my interest in these dimensions allowed what would otherwise have been a lengthy list (with innumerable codified subheadings) to become a wider ranging discourse on the evolution of African mammals. The profile of each species or group in the book summarized the basic information I was able to collect, but I also tried to portray something of the uniqueness of the animals under consideration.

Questions abounded. I found myself exploring the significance of face patterns in African forest monkeys. The bizarre nose-leaves of slit-faced bats raised the question of how they could have been elaborated from a conventional nose.

Why are there so many isolated mountain squirrels? How do honey-badgers and honey-guide birds come to associate? Can we learn more about the extraordinary architecture of fossil pig skulls by interpreting the behavior and ecology of modern pigs? These and many other questions needed investigation, and the outcome was a variety of unexpected journeys. One of the most absorbing grew out of that childish query: why the zebra's stripes? They are, after all, the most striking thing about a zebra.

Totally dissatisfied with all the current explanations for zebra stripes, I watched zebras over a period of nearly 20 years, trying to figure out what significance the stripes might have. There must be some quite remarkable explanation for three very different species of horse to be striped all over in black and white and the remaining horses and asses to show evidence of vestigial striping. My researches took in aberrant zebras too: a detailed examination of about 1,000



Grevy's zebra



Grevy's zebra

As the zebra foal gets older, there develops a decided preference for standing broadside to other zebras.

skins, and visual scanning of many times that number, impressed me with how rare it was for the striping to break down into spots or squiggles. Some very strong selective pressure must be maintaining the stripes. Considering the very wide range of climates and habitats in which zebras live, I felt a physiological or environmental explanation was impossible. Predators, parasites and temperature regulation could never exert sufficient selective pressure, and there was nothing in the zebras' behavior to suggest any hint of camouflage.

Optical advertising reaches its highest pitch in color/tone contrasts such as those between yellow and red or black and white. The most obvious recipients for the extreme visual sensations associated with the stripes of the zebra are not predators but other zebras. A foal grows up in one of the most extraordinary psychedelic nurseries that it is possible to imagine. Why? What benefits could possibly accrue from such an extreme form of visual conditioning?

The first hint of an answer lies in the observation that stripes are positively attractive. Zebras walk towards, stop and stand near one another with greater consistency than any other herbivore. This attraction operates with strangers as well as the familiar members of an established group. If there is a fight, as is often the case with young stallions, this is accompanied by a distinct ambiguity of behavior. There is a continual oscillation between tolerant, even friendly association and numerous short aggressive incidents. In the day-to-day existence of zebras, a high measure of intolerance—a

tendency to keep others away—is continually being counteracted by some stronger force that encourages social cohesion. It is possible that the mechanism for this cohesive force is a visual one exerted by the stripes.

In common with monkeys and many other mammals, zebras nibble or groom one another in friendly encounters. There is much in the behavior of young zebras to suggest that an early association between this tactile grooming and "optical stimulation" from the stripes might lead to a form of loose visual bonding. Many animals have evolved visual "markers" to direct companions to those parts of the body that function in friendly encounters, whether the part is some organ, a gland or simply a favorite grooming area. In horses, the preferred spot for nibbling and grooming is the mane and withers; so it is significant that the most persistent striping on zebras, asses and some horses (and all equine hybrids) is on the neck and shoulders.

When a horse raises its head, the skin at the base of the neck wrinkles. It is therefore possible that the evolutionary origins of striping on the shoulder lie in enhancement of a natural characteristic. The purpose of shoulder stripes could have been to direct partners to the preferred site for grooming.

It was the observation of a very curious peculiarity in zebra behavior that first led me to consider stripes as the manifestation of a unique bonding system. I was reared from infancy in very intimate contact with horses and donkeys and knew their susceptibility to grooming. Watch-



Common zebra



ing common zebras I noticed that as a foal matures it grooms its mother and is groomed by her less and less, but that it sometimes exhibits the gestures of grooming, especially champing the mouth and nodding the head, while standing a few feet from the nearest zebra. As the foal gets older these gestures become less obvious, but there develops a decided preference for standing broadside to other zebras.

In Grevy's zebra, this preference is so pronounced that I find I can sometimes predict where one zebra approaching another will halt. Given that black and white stripes have a very powerful effect in the brain, their early and intimate association with grooming and security could serve to ease temporary social relationships by making any other zebra attractive.

Physical grooming, by its very nature, must be limited to two partners at a time. "Visual bonding," if it exists, can embrace a number of neighboring animals and need not involve physical contact. The benefits of this optical system would include greater cohesion in animals that otherwise might lead a more scattered, fragmentary and therefore more dangerous existence.

There are several very different dimensions to the discussion of zebra stripes that seldom get aired in the simplistic explanations of camouflage, etc. For example, an approach to animal pattern in general (and most particularly to interpreting the zebra's stripes) should begin with the eye and its sensitivities. We know that there are visual neurons that respond to tonal contrast, neurons that respond to "edges," others that register pattern frequencies, others for perceiving linear orientation and still others that may detect the "flicker effects" of moving edges.

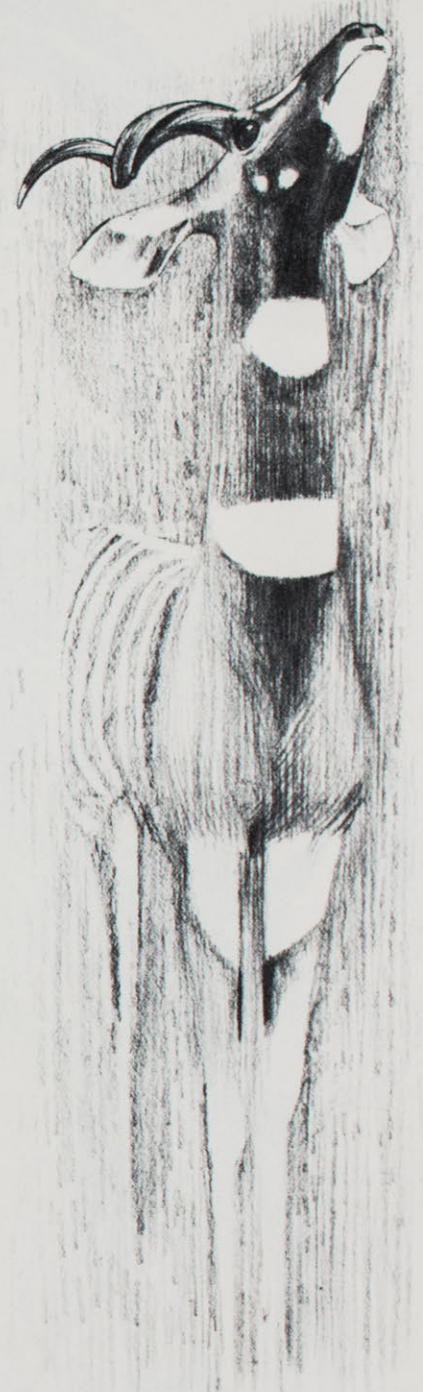
In their experiments on animal vision, investigators have devised a wide range of visual tests using black and white bars

and symbols. I believe that the zebra also exploits some of the responses of optical neurophysiology for its own social ends. Indeed, where else, outside a laboratory, shall we find a more effective system for exploiting five primary visual responses than the zebra's stripes?

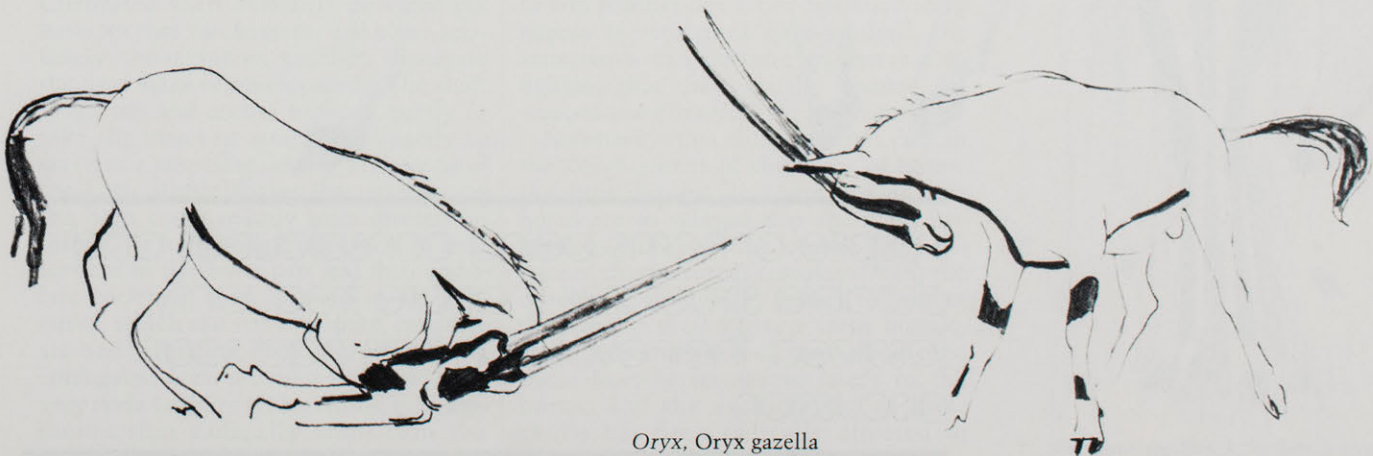
When one bears in mind the complex coordination of physiological and embryological processes that underlie the zebra pattern, it is all the more impressive how rare aberrant patterns are: what a remarkable degree of control is required to maintain such a pattern in three species of zebra, each with a different social system, living in very different environments. The existence of vestigial stripes in horses and donkeys implies that their common ancestor was striped. Indeed the stripe mechanism might even have evolved in three-toed protohorses. In an evolutionary perspective, the stripes of a zebra are therefore far from skin deep. It is intriguing to wonder (and theoretically should be possible to test) what would happen to the social behavior of zebra groups deprived of their pattern. Can horses and asses help us find the answer? If their ancestors were striped, how do they manage without?

If the stripes play the important social role that I suggest, a great deal remains to be learnt about the conditioning process and about the social development of zebras. What are the implications of striping for other species of animals?

Another familiar topic predictably engaged my interest—antelope horns. Collected as trophies for centuries and the subject of an enormous international club where hunters vie with each other to collect the longest horns, it may seem surprising that there has been very little effort to seek the biological meaning of such elaborate forms. In spite of being conspicuous and durable structures that are frequently fossilized, their evolution has also had scant discussion.



Lesser kudu, Tragelaphus imberbis



Oryx, Oryx gazella

Greater kudu (Tragelaphus strepsiceros). The kudu's methods of sparring with its horns seem to reduce the danger of fighting. Heads are lowered, and horns are laid lengthwise against each other so that the twists easily engage: a see-saw pushing and twisting contest ensues.



In spite of horns being conspicuous and durable structures that are frequently fossilized, their evolution has had scant discussion.



In populations of suni (Neotragus moschatus), as in those of all species of dwarf antelope, the first signs of horns in a young male elicit persecution from

the male holding the territory in which the adolescent was raised. Although the youngster may postpone the inevitable with elaborate appeasement behavior, it is ultimately driven off to establish a territory of its own.



Grant's gazelle, Gazella granti

It is perhaps no surprise to find that horned species with the greatest number of primitive characteristics, such as steinbucks, tend also to have simple, smooth, spikelike horns. These species are territorial and often kill intruders or rivals with stabs in the neck or body. Such murderous intolerance may be appropriate to space animals out at a density that will match food and other resources, but it is a clumsy and wasteful inhibitor of social life. The first elaboration to the simple spike can be seen in some small antelopes, where the horn is deeply corrugated and is sharply deflected backwards. These species are more prone to use the shaft of the horn for a glancing blow, like a knuckle-duster, and may sometimes engage in frontal combat, a confrontation that is only slightly less dangerous than stabs with an upright spike.

Frontal combat puts a premium on holding off, deflecting, wrestling or otherwise blocking an opponent. The corrugated shaft evidently provided the basis for this mechanism, and some relatively conservative gazelles illustrate the next stage of development. The shaft lengthens and arches forward, partly to take the brunt of attacks and partly to serve as a ramming device. Flattening of the horn profile shows that stresses on the horn come mainly from directly in front. The horns of gazelles tend to arch forward in the lower part and then undulate back and then forward in an open curve, which can serve as spike, catching arc and wrestling hook. An undulating corrugated horn provides the basis for a very wide range of elaborations, developments that radically transform the

shapes of bovid heads and result in the wide variety of horns we find today.

The wide splay of an impala's horns are well suited to catch an agile opponent, and the double curve assists in the head-wrestling and twisting that follows.

Sable and roan antelopes conduct battle dropped on their front knees. The splendid sickle-shaped horns clash along their arches, giving the combatants a near-stunning measure of their opponent's weight and strength. Many large antelopes kneel to fight, a technique that has been likened to "limited war." The strategy seems to be correlated with relatively long or slender legs, suggesting that the vulnerable instability of fighting in a standing position favored the kneeling position. The advantages of kneeling would seem to be mainly on the side of the defender rather than the attacker, so why do both contestants kneel? In the evolution of weapons, successful defense may be more significant than successful offense. The defender holds his rival off to win another day. Once defensive techniques or structures have evolved, the structures can become so integral to fighting that they actually become the weapon used in offensive behavior.

Nowhere is this more apparent than in the development of the bases of horns, the horn bosses. In some bovids, the horns are so splayed that the main impact of a blow is on the forehead; appearance of this feature is correlated with the development of heavy bosses to protect the brain. In their different ways, buffalo, gnu, sheep and musk-ox have all adopted these heavily reinforced bases to the horns, and the architecture of their skulls has been radically affected to



Southern reed buck, Redunca arundinum

Many large antelopes kneel to fight, a technique that has been likened to "limited war."

*Gerenuk,
Litocranius walleri*



*Suni, Neotragus
moschatus*

stand up to the stresses and strains of combat. Most of these animals rely less upon the tips or points of their horns than upon the blunt clashing of protective boss against protective boss.

It is often assumed that horns are an exclusively male prerogative. In fact there are many species of antelopes in which females possess and use well-developed horns. In some, such as the eland and bongo, protection of the young may be significant, but in the majority of cases female horns are weapons that are directed at other females of the same species. In all cases, the females use their horns to regulate their own share of resources, whether through territories or hierarchical peck orders. Where males only are horned, they specialize in regulating access to the best home ranges. Since males are inhibited from attacking hornless juveniles, females may benefit by imitating this defenseless condition.

The factors that determine whether an antelope will be horned or not, and whether horns will be long or short, straight or curved, thick, thin, complex or simple, provide fascinating topics for naturalists and scientists. But for most of us the sheer beauty and variety of shape in horns continues to be a major attraction of antelopes.

No less than the zebra stripes, the shapes of antelope horns are only comprehensible with deep perspectives in time and much comparison between living species.

Only paleontology can provide concrete evidence for what happened in the past; in the case of horns, it is fortunate that bony cores fossilize well. However, for these fragments of prehistoric history to yield their full burden of information, we still need to know a great deal more about living animals. For example, we need to document, in considerable detail, the fighting techniques of every major bovid species. Horn shape and size can probably be related to the details of social organization, to body weights, to special features of the environment and to the relative population densities and dispersion patterns of particular species or populations. If we learn enough about living species, we may be able to make more accurate reconstructions of extinct species and ecosystems.

It is an indictment on our race that immense sums continue to be spent on the hunting of these animals for their trophies and yet no effort has been made to explore what these structures mean. The trophies may soon join fossils as the



Cape buffalo (Syncerus caffer caffer). Buffalo opponents may charge and collide head-on. The momentum built up in a charge may be judged from an incident in Uganda in which a buffalo charged a man, missed him and broke its own neck against a tree.

only evidence we have left of vital, competitive animals, which are no less interesting or valuable than the herds of goats, sheep and cattle that are replacing them.

Huge injections of capital from foreign-aid agencies speed the replacement process. The national, international and private organizations that finance and service the livestock industry have done as much to hasten the decline of antelopes and other wildlife of Africa as all the poachers put together. It is ironic that the very species that are being destroyed often offer us unique opportunities to learn more about how ruminating animals exploit unusual habitats with maximum efficiency. However, the picture is not all gloom. Conservation and research in East Africa is better served than in most areas of the continent. The three East African governments have all made explicit commitments to conservation and have set aside huge reserves and national parks. Voluntary bodies and tourism give real financial backing.

If the conservation areas that are currently designated in East Africa were to be maintained, there is little doubt that most of the animals for which this region is justly famous would be safe from extinction. But annual birth rates in the



Cape buffalo

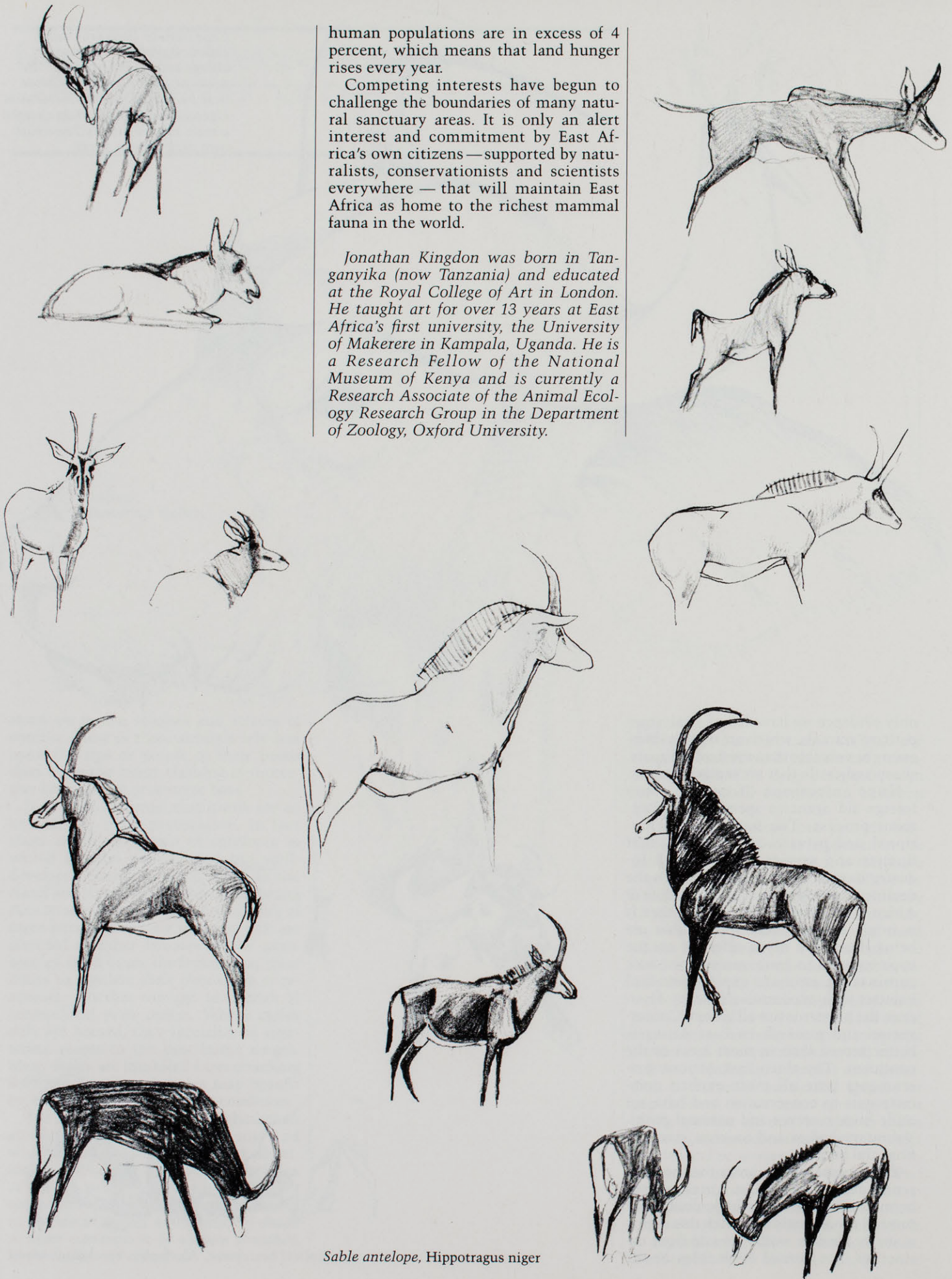


Lelwel hartebeest, Alcelaphus buselaphus lelwel

human populations are in excess of 4 percent, which means that land hunger rises every year.

Competing interests have begun to challenge the boundaries of many natural sanctuary areas. It is only an alert interest and commitment by East Africa's own citizens—supported by naturalists, conservationists and scientists everywhere—that will maintain East Africa as home to the richest mammal fauna in the world.

Jonathan Kingdon was born in Tanganyika (now Tanzania) and educated at the Royal College of Art in London. He taught art for over 13 years at East Africa's first university, the University of Makerere in Kampala, Uganda. He is a Research Fellow of the National Museum of Kenya and is currently a Research Associate of the Animal Ecology Research Group in the Department of Zoology, Oxford University.



Sable antelope, Hippotragus niger

ABSINTHE, ABSINTHEURS and ABSINTHISM

A BRIEF HISTORY OF WORMWOOD

by WILLIAM A. EMBODEN

Absinthe mania pervades all classes, rich and poor alike. Everyone knows that in Paris the men have certain hours set apart for the indulgence of this fatal craze...and in a very short time the love of the hideous poison clings so closely to their blood and system that it becomes an absolute necessity of existence.

*Introductory note to Wormwood
by Marie Corelli, 1890*

In reading a recent gourmet magazine discussion of the preparation of "oysters Rockefeller," I noted that the author suggested that the distinctive flavor of this dish is imparted by the addition of a few tablespoons of absinthe. This gave me pause as the beverage known as absinthe has not been marketed for over 50 years. It also caused me to reflect upon the fact that interest in hashish, opiates and cocaine in the latter half of the twentieth century has all but occluded our vision with respect to the use of other drugs; most notable among these is absinthe, whose toxic principle is derived from the European herb *Artemisia absinthium*.

Among the myriad posters decorating the walls of Paris in the 1890's were many advertising various brands of absinthe. The artists Lautrec, Degas, Rops, Lunois and Lefebvre all put their talents to use depicting the absintheurs of Paris. These were not only prostitutes and habitués of the cafes and bars but included many notable personages. The death of Lautrec at age 37 was attributed at the time to his passion for absinthe. Sarah Bernhardt and her equally famous partner Coquelin appeared in absinthe advertisements. The powerful, narcotic liqueur was rivaled in popularity only by those wines fortified by cocaine, such as the famous "Vin Mariani."

The blue-green absinthe was poured into a glass; over this a perforated silver strainer was used to hold a lump of sugar through which cold water would be poured. Five parts of water to one part absinthe was the usual dilution. The mixture then became opalescent, and the inherent bitterness was ameliorated.

As the drinking of absinthe became



Artemisia absinthium. From American Medicinal Plants by Charles F. Millspaugh, 1887.

ritualized, the brands that became most competitive were those that had the finest blue-green color. Although green glass bottles imparted some of this color,

it was more frequently achieved by adding copper sulfate and indigo dye. If the opalescence desired was not achieved by normal preparation, some firms added the metallic toxin antimony chloride to provide the desired appearance.

While the ragings of Marie Corelli were excessive, many individuals underestimated the toxicity of absinthe and confused its effects with those of alcohol. Distinctions between alcoholism and absinthism were first made in the *American Journal of Pharmacy* in 1868. "[Absinthe] produces neither the heavy drunkenness of beer, the furious intoxication of brandy, nor the exhilarant intoxication of wine. It is an ignoble poison, destroying life until it has more or less brutalized its votaries, and made driveling idiots of them." Such information was not widely publicized and did nothing to reduce the number of absintheurs in Europe and America. The popularity of the beverage grew, and it was widely accepted among all classes.

Those who became "addicted" to the beverage exhibited a syndrome of symptoms that were more severe and protracted than those caused by alcoholic beverages alone. Fatigue, mental depression, anxiety, paranoia and hallucinations were all common to the absintheur. Gastrointestinal disturbances and weight loss were common as were sleeplessness and a jaundiced aspect. Muscular spasms of the face and limbs added to the bizarre appearance of the absinthe drinker. Some of these are poignantly captured by Degas and Lunois, who seemed to empathize with the unfortunate victims of the toxic beverage.

Only recently have scientists revealed the mode of action of absinthe in the human system. Absinthin and thujone

"It is an ignoble poison, destroying life until it has brutalized its votaries and made driveling idiots of them."

are oils in the leaves of the plant that cause permanent destruction of the synapses of the nerves, thus inhibiting normal transmission of impulses. Interference with the cerebral spinal vessels of the meninges of the brain is usual. In 1975 Dr. Gosselin and his associates working in Baltimore pointed out that the oil thujone, common to many plants in addition to *Artemesia*, is similar in structure to the tetrahydrocannabinols of *Cannabis* (marijuana) and that, if concentrated, the latter might have similar effects in human metabolism.

The history of absinthe is most intriguing. Toward the end of the nineteenth century, a French physician living in exile in Switzerland concocted a combination of wormwood, other herbs and brandy and sold it to the French firm of Pernod. Dr. Ordinaire, the inventor of the distillate, had no idea that it would soon become one of the most popular alcoholic beverages in the world.

Vermouth, which now consists of wine and as many as forty herbs, was the progenitor of absinthe. When, by way of Dr. Ordinaire, vermouth became transformed into absinthe, the usual ingredients were the root of *Angelica archangelica*, the rhizome of sweet flag (*Acorus calamus*), leaves of dittany (*Dicamtanum albus*), seeds of common fennel (*Foeniculum vulgare*), leaves of hyssop (*Hyssopus officinalis*), and oil from the fruit of anise (*Pimpinella anisum*). Of course every manufacturer had his own variation on the above combination of herbs, but these imparted the characteristic aroma and flavor. The best known brands of absinthe boasted an alcohol content of from 70 to 80 percent!

In the year 1908, a ban on absinthe was initiated by Switzerland. In 1912 the United States adopted similar restrictions, and France followed suit in 1915. The liqueur production then moved to Spain, where it flourished until the Spanish Civil War (1936 to 1939). The liqueur Pernod is still marketed, but it does not contain the distilled oil of *Artemesia absinthium*, nor is it as alcoholic as the original formulations of absinthe. The mode of consumption has not changed much, except most connoisseurs prefer to forget the sugar when adding water. A gourmand cannot imagine a dish of oysters Rockefeller without a soupçon of Pernod—but certainly not absinthe.

The history and mythology surrounding *Artemesia absinthium* are as interesting as those of the beverage absinthe.



"Absinthe Mugnier," a French poster of 1893.

The dull silver-green weed that Linnaeus christened *Artemesia absinthium* has a considerable history. One suggested origin is Artemis, the Greek Diana, who is said to have discovered the herb. Another attribution is to Artemisia, Queen of Caria, who is said to have bestowed her name upon the plant after having been healed by it. Or, we may believe Apuleius, who stated that Chiron, the centaur, received it from Diana so that he might use it in his healing practices.

Early uses for the plant were diverse. It was rubbed upon the head to drive away lice, spread upon grainary floors to prevent the destruction of grain by weevils, and used as an antidote to poisonous fungi and hemlock as well as to the bite of "sea dragons." Sickrooms were

washed with infusions of *Artemesia*, and smoldering fires were laden with wormwood to fumigate rooms where the sick had been (fumigation literally means "to purify by smoke").

When wet nurses wished to wean a child from their breasts, they would smear the nipples with oil of wormwood: the bitterness would turn the child away from the paps. In this context, one may understand the cry of Hamlet, "Wormwood... wormwood," as that of a child betrayed by his mother. It is this same plant that is used in *A Midsummer Night's Dream*. Oberon touches Titania's eyelids with this plant of Diana to counteract the effects of the wild pansy (pain's ease, or love-in-idleness):

Be as thou was wont to be;
See as thou was wont to see:
Dian's bud o'er Cupid's flower
Hath such force and magic power.

A popular belief in Europe was that an aspiring lover wishing to see a vision of his beloved might, on St. Luke's day, drink an infusion of vinegar, honey, marjoram, marigold, thyme and wormwood. If the concoction were strong enough, one may imagine that stupor and hallucinations might well account for a perpetuation of this belief.

Artemesia had been used in the Middle Ages to thwart malefactions such as witchcraft and evil spells. It had strong ecclesiastical associations (as did rue, basil and numerous other herbs). Under the name *Cingulum Sanctus Johannis* (St. John's girdle), the plant would be worn about the waist as one of the sour herbs of grace. When thrown on the fires of Midsummer Eve, it would render the propitiary free from all evil for a full year.

In the apocalyptic vision of St. John, he spoke of wormwood: "And the name of the star is called Wormwood; and the third part of the waters became Wormwood: and many men died of the waters, because they were made bitter" (Revelations 8:12). While wormwood did not prove to be the ending of the world in the late nineteenth century, countless lives were destroyed by the toxic effects of the oil of that plant.

One of the earliest practical uses for wormwood was the addition of a sprig of the plant to bottles of wine to thwart microorganisms causing spoilage. Just as female hops blossoms were added to beer to keep it from becoming "ropy," herbs were added to wine to impart flavor and prevent spoilage. May wine had the addition of a small branch of woodruff (*Asperula odorata*), and vermouth in its

"It is a comfort for hart and the braine, and therefore to have it is not in vaine."

original form had the addition of *Artemesia absinthium*, either as a leafy spike or as distilled oils. The common name of *Artemesia* suggests one of the uses of its oil, that of dispelling intestinal parasites and especially worms.

Prior to the use of concentrated distilled oils, teas were made of wormwood leaves, and Tusser wrote in *July's Husbandry* (1577) of this plant: "It is a comfort for hart and the braine, and therefore to have it is not in vaine." Had not the venerable Dioscorides written in the *Juliana Codex* of the first century that wormwood was a fine antidote to intoxication? Absinthe later was to be recommended by physicians to those who were of a "nervous temperment" and in need of a "mental restorative."

In 1772 Dr. John Hill in his giant compendium of medical botany recommended that "an ounce of these flowers be put into a pint of brandy and let to stand six weeks" in order to prevent the gout and gravel (gall stones). He stated further that he had followed the advice of the famous Baron Haller "very happily" and had derived great benefit from the Baron's example.

As with opiates, it would seem that individuals established an addiction or habituation based upon an initial series of treatments designed as medication rather than by hedonistic forays into the realm of narcotics. Only after its widespread promotion in France as a nervine digestive tonic did absinthism take hold of a segment of the populace. Previously it was restricted to those who suffered from "neuraesthesia, hemicrania and nervous spells."

In the eighteenth century, people had great confidence in the ability of the herb to drive away the plague, and to that end they filled their pillows with it, hung it about their homes, had it strewn about their floors, and burned it to fumigate residences. Clothing was washed in vats of boiling wormwood. The wormwood trade in London was greatly enhanced by rumor in July of 1760. It was whispered all over town that the plague had broken out in St. Thomas's Hospital. On the day following the instigation of that rumor, the demand for wormwood was so great that the herb sellers in Covent Garden could not meet it. In the following days, the price of the herb rose by 40 percent, and villagers from outlying areas flocked into London to make a handsome profit on their wormwood. When the supply was all but gone, it was found that the rumor of the plague was false.

Much of the reputation of wormwood



Alexandre Lunois' portrait of an absinthe drinker.

in England can be traced to that bizarre figure, Nicholas Culpepper (also spelled Culpeper in some editions of his works). The astrologer/physician/botanist referred to himself as a student "in physic and astrology." His book *The English Physician* has the distinction of never having gone out of print since its publication in the seventeenth century. This may be attributed to the continuing vogue for astrology rather than to real merit in the many uses for the plants that he described in his treatise. His commentary on wormwood is particularly

delightful for reason of the following assertion made on behalf of *Artemesia*: "The herb is good for something, because God made nothing in vain."

A 1780 edition of Culpepper's work contains the following remarks on wormwood:

Wormwood is an herb of Mars...it is hot and dry in the third degree. Wormwood delights in Martial places, for about forges and iron works you may gather a car-load of it. It helps the evils Venus and the wanton boy produce. It remedies the evils choler[a] can inflict

"The herb is good for something, because God made nothing in vain."



A French poster advertising the Berthelot brand of absinthe.

on the body of a man by sympathy. Wormwood being an herb of Mars, is a present remedy for the biting of rats and mice. Mushrooms are under the dominion of Saturn, if any have poisoned himself by eating them, Wormwood, and herb of Mars, cures him, because Mars is exalted in Capricorn. Suppose a man be bitten or stung by a martial creature, imagine a wasp, a hornet, a scorpion, Wormwood, and herb of Mars, gives you a present cure.

The extravagant claims continue for many pages and include the following: freeing virgins from the scab, curing melancholy in old men, making covetous men splenetic, curing the right eye of a man and the left eye of a woman, taking dull wittedness from those drunk in the morning, curing both spleen and liver, preventing drunkenness and, most importantly, preventing the pox (syphilis). His diatribe on wormwood rambles on and finally concludes with the statement "This shall live on when I am dead." Unfortunately, in the present proliferation of pseudoscience and astrology, all of this does live on—without vindication.

Absinthe is now illegal in all countries marketing distilled beverages, and the absintheur of languid expression is an

absent figure. Consider these words of the popularist Marie Corelli, who wrote from her home in Switzerland in 1890 when absinthism was all the rage:

The effects of its rapid working on the human brain are beyond all imagination, horrible and incurable, and no romanticist can exaggerate the terrific reality of the evil... it has spread, and is still spreading, over the continent of Europe.

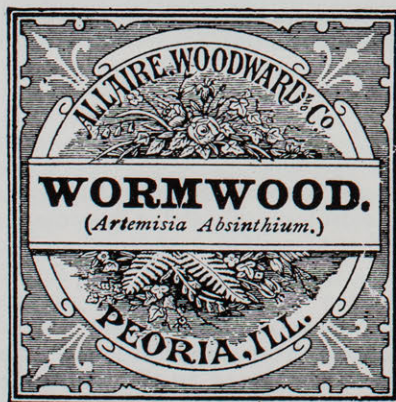
But absinthe is now all but forgotten except by a few individuals who mistake the green liqueur Pernod for it. Descrip-

tions of "absinthe mania" and the "fatal craze" are preserved in the works of Marie Corelli, which resemble the script for "Reefer Madness" in their lurid eccentricity. But all that remains of the phenomenon are some rare and splendid posters and paintings.

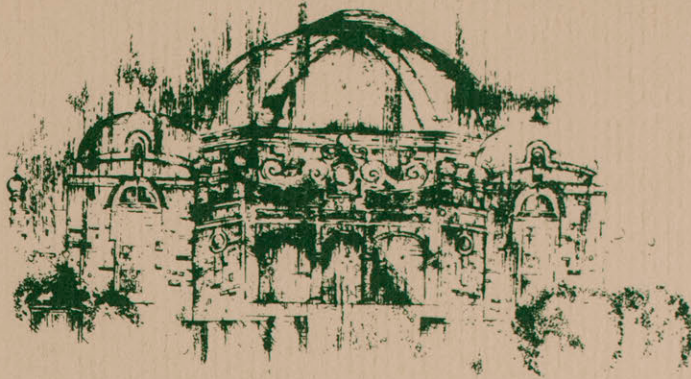
The herb *Artemisia absinthium* is not proscribed by law in any of the countries banning absinthe. Few people are aware that this European weed was as popular in its day as *Cannabis* and its derivatives are at this time. Both are weeds taken into cultivation, and both have products of similar organic structure and possibly similar metabolism.

The herb is occasionally found in herbal stores in the form of dried leaves that are suggested as being of value in digestive complaints or for creating a healthy appetite. It is wiser and safer to use a few other herbal preparations for these disorders despite all of the claims of Nicholas Culpepper and his successors.

Dr. Emboden is Professor of Biology at California State University at Northridge. He is a Research Associate of the Natural History Museum of Los Angeles County and the Botanical Museum of Harvard University. He is author of several books on narcotic and hallucinogenic plants.



Leaves of *Artemisia absinthium* marketed as a "narcotic" circa 1906.



Dear Member:

WE HAVE BEEN CHALLENGED!!! The Natural History Museum has been awarded a \$750,000 Challenge Grant from the National Endowment for the Humanities.

WHY AN NEH GRANT? THREE SIMPLE REASONS:

- Our History and Anthropology collections are among the best in the world. The NEH grant will help keep them that way.
- We want to exhibit more of our wonderful collections—vintage cars, pre-Columbian sculpture, Native American artifacts. The NEH Grant will assure your continued enjoyment of all our programs and exhibits.
- The NEH recognizes that our membership is committed, that you will help meet the challenge of this grant.

THE CHALLENGE IS NOW. Our NEH allocation for 1983 is \$250,000. But in order to receive it, we must raise \$250,000 in matching funds or pledges by July 1983.

YOUR OPPORTUNITY TO HELP IS NOW. We're grateful for your continuing support as a Member of the Natural History Museum. Now we must ask you for your additional support. Every dollar is important; *no gift is too small or too large!* If each member participates with at least a \$25 gift, we can apply over \$200,000 to our immediate goal.

PLEDGE TODAY. Help us expand our History and Anthropology exhibitions and programs—for the enjoyment of you and your family—by making a pledge today, using the form below. You can send your gift now, or we can bill you later. As always, your gift is tax-deductible to the extent allowed by law.

THANK YOU FOR YOUR SUPPORT. Each year the Natural History Museum makes History and Anthropology come alive for over 1.5 million visitors. Your gift toward meeting the NEH Challenge Grant will help assure our continued growth and success.

Sincerely,

Craig C. Black

Director, Natural History Museum

A PLEDGE TO HELP MEET THE CHALLENGE

I want to help the Museum meet the NEH Challenge!

☐ For 1983, I pledge ☐ \$25 ☐ \$50 ☐ \$100 ☐ Other \$ _____

☐ My check is enclosed.

☐ Bill me in July.

Name _____

Address _____

City _____

Zip _____

(Please make check payable to "Natural History Museum Alliance." Send this form and your check to Natural History Museum Alliance, 900 Exposition Boulevard, Los Angeles, California 90007. Your contribution is tax-deductible to the extent allowed by law. Thank you for your pledge!)

SUMMER PROGRAMS FOR MUSEUM MEMBERS

The Museum's summer programs for Members offer entertaining and enlightening experiences for all ages, including:

- Craft courses for adults, where students 16 and older will turn stained glass, basket reeds and straws, and other raw materials into objects of traditional beauty and function.
- Adventures in natural sciences for children, where budding naturalists from Grades 1 through 7 will observe, collect, and learn about wildlife and geology of the past and present.
- A day at Marineland for the family, with a special admission fee and breakfast program just for Museum Members.

Sign up early for the activities of your choice, and plan on a summer of enjoyment and education.

SUMMER CRAFT CLASSES FOR ADULTS

During the month of July, the Education Division of the Museum is offering a series of summer craft classes for people 16 years of age and older. The classes will include the following:



PROFESSIONAL FLOWER CRAFT, Dodie Lyness, Instructor Tuesdays, July 12th and 19th, 10am to 1pm

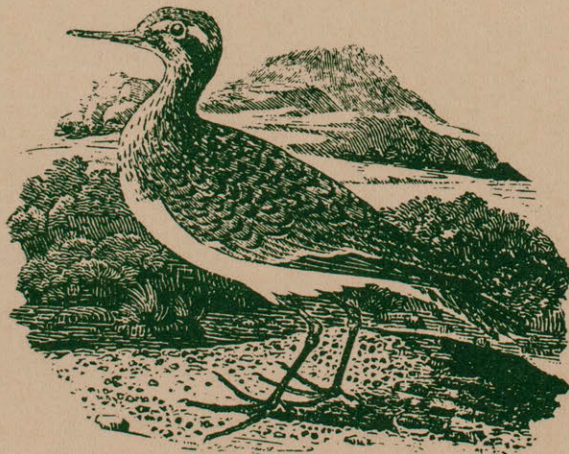
Add decorator touches to your home with beautiful flower and fragrance items that you make yourself. Working mainly with natural materials, you will fashion floral wreaths for all seasons, pack aromatic spice jars, assemble Victorian-style "Tussie-Mussie" nosegays and scented "Posey Pomanders," and craft other whimsical items.

STAINED GLASSWORKING, Gary Straub, Instructor Thursdays, July 7th, 14th, 21st, and 28th, 10am to 1pm

This class covers the fundamentals of stained and leaded glass and all basic aspects of glassworking, including design, cutting, leading and finishing. During the four sessions, you will create a 15- by 20-inch window and will acquire the skills necessary to continue working on your own.

BIRD CARVING I: SHORE BIRDS, Robert Young, Instructor Saturdays, July 16th and 23rd, 9am to 1pm

In this class, which is the first in a series on wild bird carving, you will learn basic wood working techniques while carving local shore birds, such as sandpipers, plovers and avocets; you will also explore the fascinating history of bird carving. These sessions will interest bird lovers as well as admirers of antique decoys.



Instructors of these and other craft classes will be demonstrating their skills at the Museum's 8th Annual Craft Festival on June 19th. Details on the Summer Craft Classes will be given in the June issue of TERRA CALENDAR; additional information may be obtained by calling the Education Division (213/744-3341).

BREAKFAST WITH ORKY AND CORKY!

Please join us on Saturday, June 25th, for breakfast with Orky and Corky, Marineland's performing killer whales, and a special early morning exploration of the marine park offered exclusively for Museum Members.

The day will start at 8am with a continental breakfast of juice, sweet rolls and coffee or hot chocolate. Then the Marineland staff of biologists will give informal lectures on the park and its exotic animal residents. The lectures will include:

- A talk on Orky and Corky, the only breeding pair of killer whales in captivity. Preparations for the birth of a killer whale calf in spring will be described.
 - A description of the diseases and injuries of Marineland's pinnipeds and their treatment at the park's Animal Care Center.
 - A rehearsal session with Orky and Corky and their trainer in the Killer Whale Stadium.
- Museum Members will also see Marineland's animals feeding and observe the "off-stage" behavior of the park's stars. When the special educational program ends at 10am, participants are invited to stay for the day and enjoy all of Marineland's regular shows and exhibits.

BREAKFAST WITH ORKY AND CORKY!

We want to have breakfast with Orky and Corky on June 25th and spend the day at Marineland!

NUMBER OF RESERVATIONS _____ children at \$5.50 each \$ _____
(ages 3-11)

_____ adults at \$6.50 each \$ _____

TOTAL \$ _____

MEMBER'S NAME _____

ADDRESS _____

CITY _____

ZIP _____

DAY PHONE _____

(Please make check payable to "Museum Alliance." Send this form and your check to Museum Alliance, Natural History Museum, 900 Exposition Boulevard, Los Angeles, California 90007.)

SUMMER READING: Mammals of the Sea

The Museum Book Shop has a number of new books on history and natural history topics, including two on ocean-dwelling mammals by Richard Ellis, noted marine artist and naturalist.

DOLPHINS AND PORPOISES (Knopf, 1982) is a beautiful and comprehensive account of the forty-three species of small cetaceans. The book explores the myths that have grown up around these appealing marine mammals and details what is known about their anatomy, habitats, feeding habits, and relationships with each other, with other sea creatures and with man. The text is accompanied by numerous illustrations by the author, including eight remarkable color paintings. 270 pages, 78 illustrations (8 in color), bibliography and index. \$25.00.

MARINE MAMMALS, A SEA GUIDE (American Cetacean Society, 1982) is a catalog to the mammals that live all or part of their lives in the water. The booklet contains a brief description of the range and distinctive features of each of 107 species of whales, dolphins, porpoises, seals, sea lions and other marine mammals; illustrations of the species aid in identification and comparison. The publication gives an excellent overview of this fascinating group of animals. 26 pages, 107 illustrations, index. \$3.00.



ADVENTURES IN NATURAL SCIENCES FOR CHILDREN

This summer, children can explore the “-ologies” in natural science workshops at the Museum. In sessions specifically tailored to grade level, your child will encounter nature first-hand by observing and handling minerals and live and preserved animals and learning to recognize similarities and differences. The workshops combine education with interesting activities and provide a basis for life-long study and appreciation of the natural world around us.

Classes are open only to children of Museum Members and meet on Wednesdays and Fridays, July 20th, 22nd, 27th and 29th, in either morning or afternoon sessions; cost for four sessions is \$25 per child. Children should register for the class designed for the grade level they have completed in June. Adults may enjoy Flying Carpet Tours of the Museum while their children attend the sessions.



Grade 1, ENTOMOLOGY. In this introduction to insects, your child will watch and collect local varieties and learn to identify and mount specimens.



Grade 2, MINERALOGY/GEOLOGY. An important clue to the identity of a mineral is its hardness: workshop participants will learn to apply this and other tests as they study rocks and geology in general.



Grade 3, HERPETOLOGY. The characteristics of the cold-blooded reptiles and amphibians will be revealed to students through observation of live animals and examination of Museum specimens.



Grade 4, ICHTHYOLOGY. In a study of fishes and their life cycles, your child will see fish eggs hatch and learn of fishes' diverse strategies for survival.



Grade 5, ORNITHOLOGY. In this introduction to bird-watching, students will learn to recognize various birds and their habitats and to attract feathery city-dwellers to their backyards.



Grade 6, PALEONTOLOGY. Your child will study the different types of fossils in the Museum's collections, making casts of various specimens and learning about the origins of the rich local deposits.



Grade 7, MAMMALOLOGY. The differences between mammals and other animals will be explored in this workshop series, as will the structural and behavioral characteristics of individual species.

ADVENTURES IN NATURAL SCIENCES FOR CHILDREN

I want my child to learn more about the natural sciences this summer at the Museum!

CHILD'S NAME _____ GRADE _____

CHILD'S NAME _____ GRADE _____

SESSION PREFERRED: ☐ 10am to 12 noon ☐ 1pm to 3pm ☐ Either

MEMBER'S NAME _____

ADDRESS _____

CITY _____ ZIP _____ DAY PHONE _____

☐ I WANT TO TAKE FLYING CARPET TOURS.

(Please enclose \$25 per child. Make checks payable to "Museum Alliance." Send your registration form and check to Museum Alliance, Natural History Museum, 900 Exposition Boulevard, Los Angeles, California 90007.)

COME TO THE ISLANDS

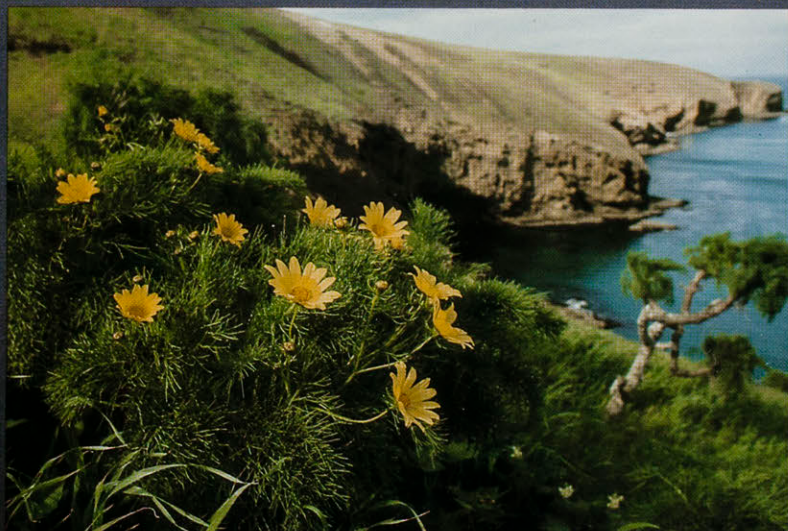
All photos by Bob Evans

Southern California's Channel Islands are a wilderness treasure that few local residents have fully explored. The islands offer lush panoramas — beaches and coves, waterfalls, forests and grasslands abounding with small wonders that invite closer inspection.

Bob Evans, a Santa Barbara photographer specializing in coastal and underwater subjects, has captured some of the grandeur and beauty of the islands on film. We present a selection of his photographs here to highlight summer activities—including five trips to selected Channel Islands—for Natural History Museum members.

Come to the islands with us this summer!

Anacapa Island



Coreopsis gigantea, Santa Barbara Island



Phacelia species, Santa Barbara Island

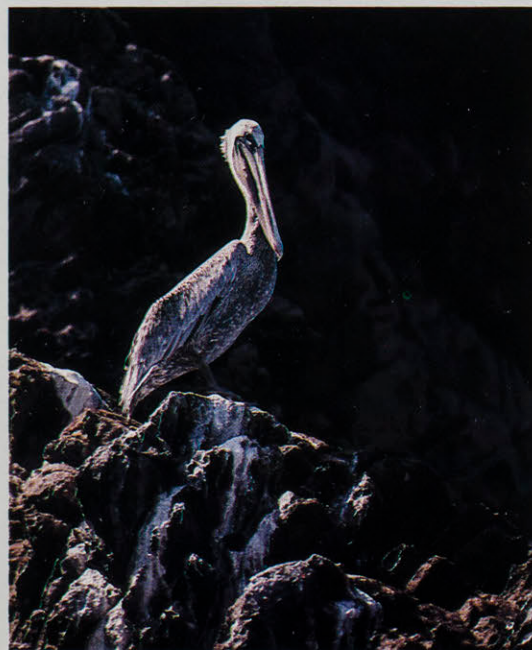


Santa Cruz Island

Pelican Harbor, Santa Cruz Island



*Sunrise,
Santa Cruz Island*



*Brown pelican,
Santa Cruz Island*



Cormorants, Santa Cruz Island



*Erysimum insulare,
San Miguel Island*



Malva rosa, *Lavatera assurgentiflora*,
San Miguel Island



Sand cast of plant roots, San Miguel Island

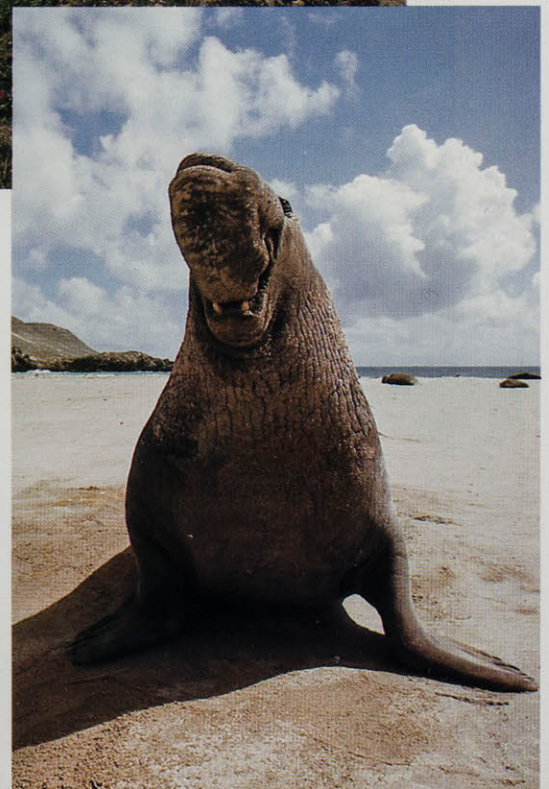


Male
elephant
seal,
San
Miguel
Island

Pinnipeds sunning, Point Bennett, San Miguel Island



Young female
elephant seal,
San Miguel Island





*Simonton Cove,
San Miguel Island*

*Point Bennett,
San Miguel Island*



NATURAL HISTORY TOURS OF THE CHANNEL ISLANDS

California Natural History Tours is offering nine "Discover California" summer tours, including five to the Channel Islands, for Members of the Natural History Museum and their friends:

Santa Cruz Island, Museum Members Only!

AUGUST 26th through 29th,
\$425 per person

Fourth of July on Santa Cruz Island

JULY 1st through 4th, \$425 per person

San Miguel Island and the Coastal Mainland

JULY 10th through 12th,
\$325 per person

Santa Barbara Island and the Coastal Mainland

AUGUST 28th through 29th,
\$225 per person

Santa Cruz Island Ranch House

SEPTEMBER 16th through 19th,
\$475 per person

A learning and relaxing stay on the largest and best preserved of the Channel Islands will be led by Dr. Don Patten, Museum Curator of Mammals. As you travel by boat to the island, you will learn about Santa Barbara Channel marine life from Dr. Patten. While on the island, you will visit the research facilities there and explore the island

interior on hikes and by vehicle; along the hiking route are well-preserved buildings dating back to the sheep and cattle ranching days of the late 1880's. You will also have time for swimming, sunning and relaxing at the beautiful sandy beach near the Prisoner's Harbor camp site. Accommodations for this 4-day tour are dormitory tents.

The camp for this tour is at Prisoner's Harbor, near historic buildings and a beautiful sandy beach; Dr. Ken Stager, Museum Curator Emeritus in Ornithology, will be your guide as you explore the island. You will have a chance to hike to the island's interior and participate in research on the activities of the

Santa Cruz Island Scrub Jay, a bird unique to the island. Upon returning to Ventura, you will have a barbecue dinner and then watch the fireworks at the harbor there before leaving for home. Sleeping facilities on this 4-day tour are dormitory tents.

Explore the northernmost island, and several places along the mainland that have similar plants and animals, on this 3-day boat tour led by Ken Stager. At stops on the way up the coast to Ventura, you will do a little bird watching, tour the new National Park Service facility and nature center, and learn about Ventura's history. The boat will then travel to San Miguel. On the trip, you will view Point

Bennett, the largest breeding area for seals on the Channel Islands, where Stellar and California sea lions are likely to be present. Island excursions include an optional long hike to the area where researchers studying Point Bennett are located. Nights will be spent aboard the boat, in dormitory single and double bunks with privacy draperies.

You will visit coastal spots between Malibu and Ventura and then journey overnight by boat to spend a day on Santa Barbara Island, the smallest of the Channel Islands. Ken Stager will be your guide; at mainland stops, you will learn about plants and animals similar to those on the island, tour the new National

Park Service nature center and learn about Ventura's history. While on the island, you will have time to hike and swim; in the afternoon, you'll travel by skiff to view the California sea lion and elephant seal rookeries there. Boat lodging is provided for this 2-day tour.

Your home base on this 4-day tour will be the rustic ranch house on the Cristy Ranch, which is located near the western end of Santa Cruz Island and has its own private mile-long beach just a short distance away. You'll hike and travel by jeep to the island interior, where Ken Stager and two guides will point out

some of the island's unique biological features. You will also visit archaeological sites that are not far from the ranch house. You will visit the pine forest found only on Santa Cruz and will be able to hike or be driven into areas that will be yours alone to enjoy. Nights will be spent at the ranch house.

Meals, transportation, equipment and accommodations with shower facilities are included in each tour package. For more information on these and other "Discover California" tours, contact the Alliance Office (213/744-3427) or Peggy McCain at California Natural History Tours (213/274-3025).

CASTAWAYS OF CALIFORNIA

The Origin of Animal Life of the Channel Islands

by CHRISTOPHER D. NAGANO, SCOTT E. MILLER and CHARLES L. HOGUE

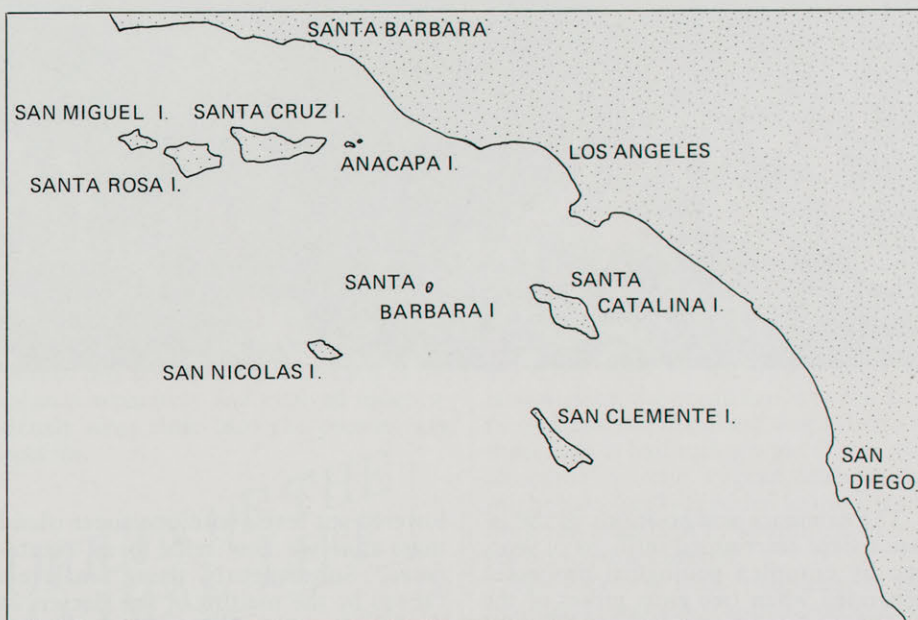
The California Channel Islands are home to a surprising variety of animals, from tiny insects to foxes and elk. Even giant mammoths lived there in the past.

The visitor asks "How did they get there?" and "How can there be so many kinds when the islands are separated from the mainland by miles of ocean?"

The answer is found in the geological history of the islands as well as in the nature of the creatures themselves.

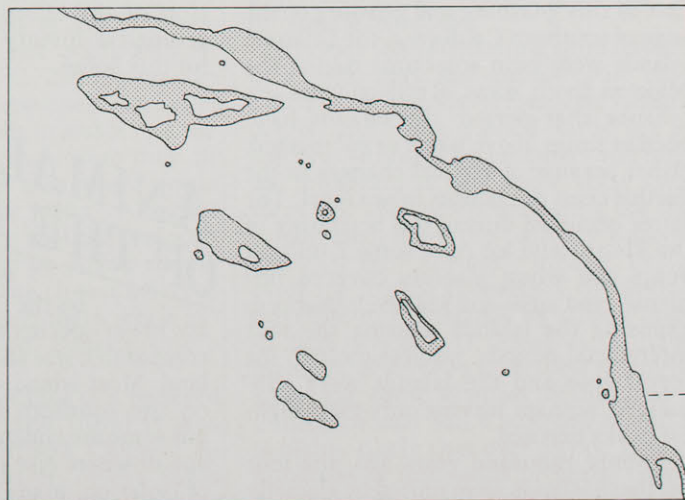
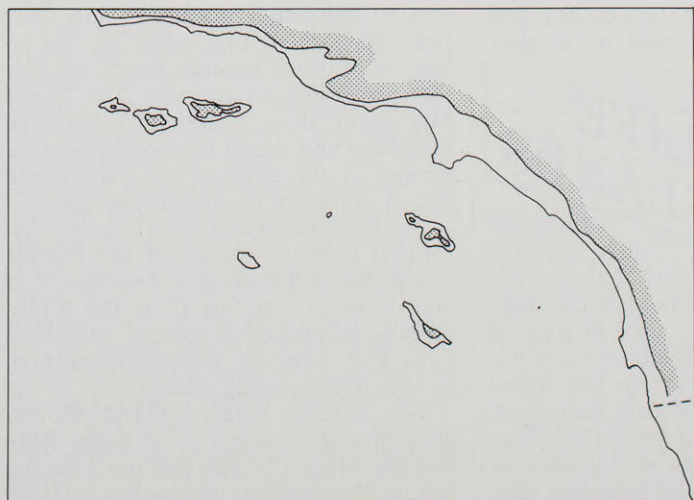
GEOGRAPHY

The Channel Island group is composed of eight islands located off the coast of southern California. The group itself is divided by a wide sea lane into a northern subgroup, consisting of four islands (San Miguel, Santa Rosa, Santa Cruz and Anacapa) and a southern subgroup (Santa Catalina, Santa Barbara, San Nicolas and San Clemente). The islands range in size from tiny 1-square-mile Santa Barbara Island to the expansive 96-square-mile land mass of Santa Cruz Island.



Above: The California Channel Islands.

Below, left: Coastlines of the mainland and the Channel Islands at the time of highest sea level during the Pleistocene Epoch (shaded) (present day shorelines unshaded). Right: Coastlines of the mainland and the Channel Islands at the time of lowest sea level during the Pleistocene Epoch (shaded) (present day shorelines unshaded). After J.G. Vedder and D.G. Howell (in D. Powers, 1980. *The California Channel Islands: Proceedings of a multidisciplinary symposium*. Haagen Printing, Santa Barbara).





Channel Islands Fox (*Urocyon littoralis*) on San Miguel Island. Photograph by Paul Collins, Santa Barbara Museum of Natural History, Santa Barbara.

The existence and positions of the islands were determined millions of years ago by complex geological processes generated when two great pieces of the Earth's surface known as the Pacific and North American tectonic plates were forced together. The junction where the tectonic plates collide is still the focus of earthquakes, mountain building, vertical shifts in the land, uplifting and subsidence, the formation of ocean troughs, and the building of mountain ranges. Out of this gnashing and gnarling of the edge of southern California, the Channel Islands were born sometime during the Miocene Epoch, some 20 million years ago.

Since that period, the islands have been at times above water or submerged, either because of vertical changes in the Earth's crust or changes in sea level. The latter occurred during the beginning of the Pleistocene Ice Ages some 2 million years ago when glaciers covered immense land areas and sea levels dropped, exposing the islands. During the four interglacial periods, glaciers melted, sea levels rose and the islands were submerged, perhaps leaving only their highest peaks exposed.

Twenty thousand years ago, the four northern islands were united by glacially

lowered sea levels into one super-island mass that we now refer to as "Santarosae." Subsequently, rising sea levels caused by the melting of the glaciers at the close of the Pleistocene separated Santarosae into the islands we are familiar with today.

The southern islands have always been separated from each other and the mainland. Some scientists have proposed that they were connected to other islands or to the mainland, but examination of the submarine geography and geological history provides no support for this belief.

ANIMAL LIFE OF THE ISLANDS

Although there is a great diversity of animal life on the Channel Islands, there are fewer species there than in areas of comparable size and habitat on the mainland. Most island species are also found on the southern California mainland, but some are endemic (found in one place and nowhere else in the world). Because of isolation, many island creatures have

evolved into forms that are much larger, smaller, or differently colored than their mainland relatives.

The Dwarf Mammoth (*Mammuthus exilis*), which was only 6 feet tall, inhabited the northern islands during the Pleistocene. Its ancestor was the 18-foot-tall Jefferson's Mammoth (*Mammuthus jeffersonii*), which had become stranded on the islands thousands of years before. Widely fluctuating food supplies in the finite island environment dictated that smaller individuals survived. Thus, over time, through natural selection, the island mammoth became much smaller than its mainland ancestor. The Dwarf Mammoth, along with many other large mainland and island mammals, became extinct at the close of the Pleistocene Epoch, some ten thousand years ago.

The Channel Island Fox (*Urocyon littoralis*) is found on all of the islands except Santa Barbara and Anacapa. It is significantly smaller than the widespread, and probably ancestral, mainland Gray Fox (*Urocyon cinereoargenteus*), to which it is closely related.

The extinct Giant Island Mouse (*Peromyscus nesodytes*) of Santa Rosa and San Miguel Islands and the Anacapa Mouse (*Peromyscus anyapahensis*) from

the island of the same name provide further examples of size modification as a result of isolation. These extinct mice were several times the size of modern *Peromyscus* mice (which are about house mouse size). Some Giant Island mice were as large as pack rats; the Anacapa mouse was slightly smaller, although still a respectably sized animal. Both are known from ice age fossils, but remains of the Giant Island Mouse have also been found in Indian middens, indicating that this creature coexisted with man and survived until some 2,000 years ago.

The Dwarf Mammoth, island mice and Island Fox are examples of the general trend for mammals—after introduction to islands—to become larger if small and smaller if large. Lack of predators apparently favors largeness; fluctuating availability of food sources leads to smallness.

Color patterns are also modified by insular selective forces. The Santa Cruz Island Scrub Jay (*Aphelocoma coerulescens insularis*) is closely related to mainland scrub jays, but it is a darker blue and has slightly different mating behavior. This animal is only found on Santa Cruz Island, although suitable habitats exist on some of the other islands.

A unique population of garter snake (*Thamnophis couchi hammondi*) inhabits an isolated canyon on Santa Catalina Island. Unlike other garter snakes of this species, this population lacks distinctive stripes and is a deep olive brown with a pale buff colored chin and lips. The present day snakes on the island may have descended from only one or a few individuals which had an unusual color pattern and passed it on to their offspring ("founder effect"). Because the Santa Catalina Island Garter Snake most closely resembles a population found at nearby Lompoc on the mainland, the latter may have been the source of the original island population. Sadly, the island snake is threatened with extinction because of snake collectors and adventive bullfrogs that eat the young reptiles.

The insects and other terrestrial arthropods (spiders, millipedes, centipedes, etc.) of the islands are still poorly known. However, the information that has been collected about some species or groups forms an important part of the study of Channel Island zoology. Although most of the island insects are largely identical to their mainland relatives, some are larger and/or darker colored than their southern California counterparts, and some are truly unique.

The Avalon Hairstreak Butterfly (*Strymon avalona*), which is found only on Santa Catalina Island, has one of the most restricted ranges of any insect in the world. Its closest relative, the common Gray Hairstreak (*Strymon melinus*), is found on all the Channel

Islands and throughout North America. The Avalon Hairstreak is distinctly different from its near relative in its smaller size and lack of dark markings on the underwings. The island butterfly probably evolved into its present form from a mainland ancestor, possibly *melinus* itself, that arrived on the island millennia ago. Alternatively, but more improbably, the Avalon Hairstreak may be a "relict" species, that is, a species that was once widespread but that now exists in one or only a few places.

Grasshoppers, crickets, katydids and their cousins (Orthoptera) are the only group of island insects to be intensively studied. Entomologists David Rentz and David Weissman found that of the 52 species of Orthoptera inhabiting the Channel Islands, 12 are found nowhere else in the entire world (they are endemic). For example, of the silk-spinning crickets (*Cnemidopteryx*), one species (*C. caudulus*) is found only on the northern group of islands, another (*C. miniatus*) only on Santa Catalina and in northern Baja California, a third (*C. spinulus*) on Santa Cruz, Santa Rosa, Anacapa and San Nicolas and a fourth (*C. pulvillifer*) only on San Clemente Island. It is unlikely that these endemic island Orthoptera represent relict populations of various species once widespread on the mainland. It is more probable that they had a common ancestor species and that members of this species arrived on each of the islands separately and evolved independently over time into the present day species.

ORIGIN OF THE ANIMAL LIFE

The animals of the Channel Islands are clearly related to the fauna of the mainland, but how they arrived is still the subject of debate. For many years, biologists assumed as "fact" that the wildlife of all islands—even those at great distance from the nearest continent—must have traveled to them over terrestrial connections or land bridges. The practice led the well-known biogeographer Dr. E. C. Zimmerman to comment, "So many continents and land bridges have been built in and across the Pacific by biologists that, were they all plotted together on a map, there would be little space left for water." A logical result of land bridges is that the composition of animal life on an island should approximate that of the closest adjacent mainland area to which there was a hypothetical connection, constituting a "balanced" fauna.

For a long time, because of a believed "balanced" fauna (and flora) it was thought that the northern Channel Islands were an extension of the Santa Monica Mountains and were once con-

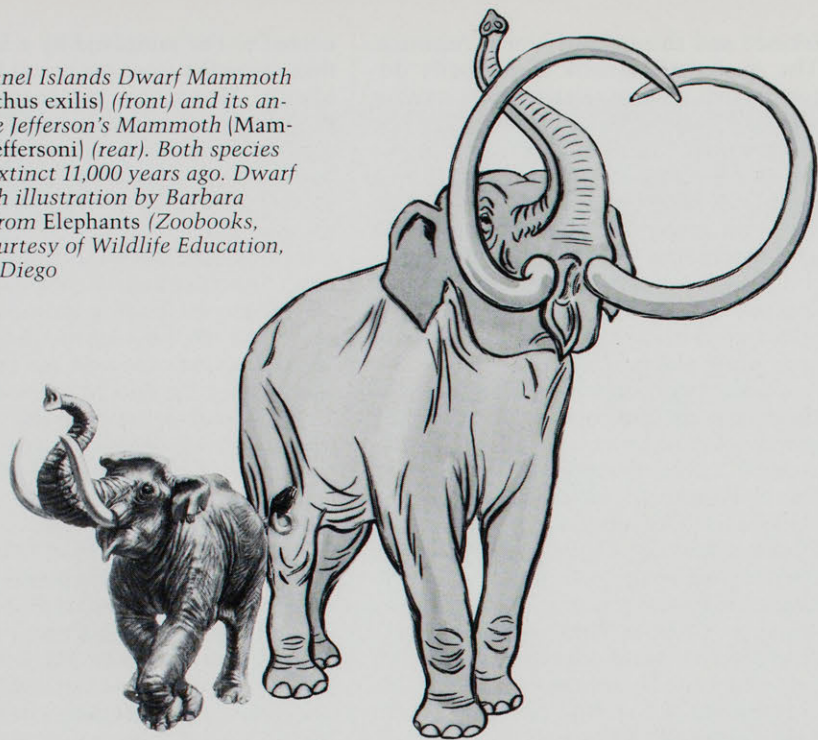
nected to the mainland by a land bridge that extended across the ocean from Point Mugu. However, modern detailed geological and biotic analysis of the two regions have revealed their biotas actually to be significantly different. For example, southern California herpetologist Jay Savage found that only 16 different reptiles and amphibians inhabit the Channel Islands compared to the 36 species known from the adjacent mainland. We now know that, even during the period of lowest sea level during the Pleistocene Epoch, there was always an ocean barrier between the islands and the mainland; because many life forms that should be on the islands are absent, the fauna is actually somewhat "unbalanced."

The concept of a land bridge to the northern Channel Islands was also based on the presence of Dwarf Mammoth fossils. It was assumed the prehistoric pachyderms and their modern counterparts were unable to cross a water barrier. But modern elephants are, in fact, excellent swimmers. Recent observers in Africa have seen them often swim in lakes and rivers, and herds on the coast have been known to travel to offshore islands, snorkeling with their trunks held out of the water. Furthermore, Indian elephants have been observed swimming in water for as long as 6 hours. Biologists now believe that, because of the lowered sea level caused by the growth of glacial land masses, the ocean gap between Santarosae and the mainland was as little as three and a half miles wide. Thus, the ancestors of the Pygmy Mammoths might have easily traveled to the islands from the mainland by swimming across such a narrow channel.

The lack of a land connection to the mainland means that animals must have reached and be still reaching the islands by flying or swimming or riding out on logs and other floating debris. Chance, not logic, is the most important factor in this way an animal expands its range. This is known as "sweepstakes dispersal" and leads to an "unbalanced" fauna different in composition from that of proximate mainland.

It is easy to envision how animals such as lizards, mice and snakes could have rafted to the islands by riding on floating debris after being washed out to sea by storms. Although salamanders and frogs are intolerant of salt water, these creatures would be protected during the trip to the islands by the partially decayed logs that they normally inhabit. Direct evidence for the probability of animals traveling to the islands by rafting came in 1955 when J. H. Prescott, a mammalogist, observed a jackrabbit sitting on a kelp raft some 39 miles off the coast of California near San Clemente Island. It is highly likely that over a time span of hundreds of thousands of years, countless animals could have been washed

The Channel Islands Dwarf Mammoth (*Mammuthus exilis*) (front) and its ancestor, the Jefferson's Mammoth (*Mammuthus jeffersoni*) (rear). Both species became extinct 11,000 years ago. Dwarf Mammoth illustration by Barbara Hoopes, from *Elephants* (ZooBooks, 1982). Courtesy of Wildlife Education, Ltd., San Diego



out to sea by storm-laden creeks and rivers, and that — by riding on drifting logs or other debris — a tiny percentage could have reached the islands alive. Further support for this idea lies in the fact that the larger of the Channel Islands that are closer to the mainland have more types of animals than those that are smaller and further away: there is a greater probability of individuals reaching the bigger and closer land masses by sweepstakes dispersal.

MAN'S ROLE

Man has also played a significant part in determining the animal life of the Channel Islands. Recent anatomical studies by Paul Collins indicate that Island Foxes on the northern islands are more closely related to each other than to those on the southern islands. It would appear most likely, therefore, that the ancestral species was introduced on rafting material to Santarosae during the Pleistocene and, once there, evolved into the smaller Island Fox. When rising sea levels separated the big island into the present day four smaller islands, the fox survived on San Miguel, Santa Rosa and Santa Cruz. The final dispersal of the foxes to the southern islands occurred when Chumash Indians arrived on the scene, approximately 10,000 years ago, and carried the foxes to San Clemente, Santa Catalina and San Nicolas in their canoes.

Although the remains of Island Foxes have been found in prehistoric refuse mounds, the relationship of these animals to the Chumash people is un-

known. The Indians may have used the Island Fox as a pet, as a food source, for its pelt (which could be used as clothing), or for use in religious ceremonies. Escaped foxes could easily have established feral populations on the other islands.

Twentieth century man has introduced animals to the Channel Islands deliberately for food or sport or accidentally out of sheer ignorance. Animals recently introduced include pigs, sheep, goats, rats, turkeys, cattle, cats, elk, deer, peacocks, dogs and rabbits; some have caused great damage to island ecosystems. Bison (*Bison bison*) have become almost a symbol of Santa Catalina since about a dozen were brought over from the mainland in 1920's to costar in the movie "The Vanishing Americans" and some episodes of the Tom Mix cowboy series. The small nucleus has increased to approximately 400 animals, which now roam freely over the island.

When animals are introduced for the first time into an area, they often experience enormous population explosions because of freedom from predators and the lack of other restraints that controlled their numbers in their native environments. Plant feeding types often consume all of the native vegetation in their new home in a short time; introduced carnivorous species may quickly eat all the suitable resident prey animals. These side effects on the native flora and fauna are magnified in isolated ecosystems such as islands.

Many areas on the Channel Islands have been devastated by goats and sheep. The former were placed on San Clemente sometime in the mid-1800's, thus the island has suffered goat-caused environmental damage for over 100 years. These feral creatures, with their

legendary vacuum cleaner feeding habits, have denuded vast areas of the island, resulting in the near extinction of many endemic plants and animals. Overgrazing, as well as elimination of vegetation caused by trampling by countless goat hooves, also contributed to erosion of the island. Recent efforts to remove the goats by trapping have been successful, however, and the luxuriant native vegetation is now beginning to recover, hopefully reversing the destruction of the last century.

VALUE OF THE FAUNA

Even before Charles Darwin voyaged to the famed Galapagos Archipelago, where many of his ideas on natural selection became crystalized in his mind, the flora and fauna of islands had fascinated scientists. Because of their relatively small size and completely self-contained biotic systems, islands are a perfect natural laboratory for investigating evolution, ecology and other biological subjects that would be difficult, prohibitively expensive or even impossible to study in larger mainland areas.

Although the Channel Islands have suffered under the hand of man for many years, efforts to restore them by governmental agencies, such as the National Park Service, and private organizations, including The Nature Conservancy, have helped to protect the remaining natural ecosystems. Yet we are still imposing diverse threats to island wildlife through increased recreational use, newly introduced animals, passing petroleum and natural gas tanker traffic, harvest of nearby marine resources, oil drilling, sonic booms from overflights of landing space shuttles, and the various military operations in the area. Whether or not the current island wildlife populations can survive remains to be seen.

Chris Nagano is a Research Associate in Entomology at the Museum and a graduate student at Yale University. He is interested in island biogeography, conservation, and the ecology and systematics of tiger beetles.

Scott Miller is a Research Associate of the Museum in Entomology and Invertebrate Paleontology and is active in Channel Islands research. He is completing doctoral studies at Harvard University.

Dr. Charles L. Hogue is Curator of Entomology at the Museum. Although his interests in insect island biogeography center mainly on the oceanic islands of the far northeastern tropical Pacific, he has visited several of the Channel Islands and encourages entomological work there among local collectors and students.

A CRAFT SAMPLER

by JOAN GRASTY

It was not so very long ago that dolls weren't made of plastic, ceramics weren't stamped "Made in Taiwan," and children knew where wool came from. People used their hands to fashion objects of use and beauty from wood, ivory, fabric or whatever was "handy." Pride was taken in creating, whether the object was for daily use or for show, and hands plied their crafts with love and skill. Assembly lines and mass production have taken their toll, but there do remain dedicated craftsmen who still practice the traditional skills of days gone by.

The Natural History Museum's annual Craft Fair, to be held this year on Sunday, June 19th, is an opportunity to see these craftsmen at work and to learn from them. Over 45 artisans have been carefully selected to represent crafts from many different times and places. The artists are chosen both for excellence in their craft and the ability to demonstrate their techniques. From many different interests and backgrounds, some pursue their crafts as careers while others are dedicated hobbyists. All the craftsmen, however, are linked by an awareness of the historic importance of their crafts and the desire to perpetuate them.

Scrimshaw, truly an American art form, was practiced by 19th century whalers during long sojourns at sea. The raw materials first used probably were the jaw bone and ivory teeth of the sperm whale, but the versatile artists soon expanded to other materials, including bone from other sea mammals and elephant and hippopotamus ivory.

Joe Cocke of the Museum's Education Division developed his interest in scrimshaw when he was in high school and in 1966 started experimenting with designs of his own. Because whales are protected animals and elephant ivory cannot be imported legally, Joe does his work on old ivory and cow bone. The material has to be very carefully prepared by sanding and buffing until the surface is so smooth that ink will not adhere to it. The design is pencil-sketched onto the prepared surface and is then carefully carved into it with a knife. When the carving is finished, the etched surface is rubbed with India ink to create a dark design on the cream background. Hours of work achieve truly beautiful results.

Museum docent, Pat Woolley, has been



Botanical illustration by Frances Runyan

performing and displaying at the Craft Fair since its inception in 1975. One of her specialties is the art of Ukrainian egg decorating. Decorated eggs were originally used in pagan spring festivals to help insure good harvest and good luck; with the introduction of Christianity into the Ukraine in the tenth century, the eggs were incorporated into the Easter celebration. The eggs are intricately patterned and brightly colored using a wax-resist or batik process. The design is marked on the plain egg using a stylus and beeswax heated in the flame of a candle. Then the egg is dipped into a dye bath. The wax and dye process is repeated several times with progressively darker colors. To reveal the final design, the wax is melted away in the flame of the candle. Each color and design motif has a traditional meaning in Ukrainian folklore.

This year Ms. Woolley will be demonstrating the art of wheat weaving. Although English "corn dollies" are no longer made in order to preserve the seeds of the fall harvest for the spring planting, traditional designs are still produced by craftsmen in the English coun-

EIGHTH ANNUAL CRAFT FAIR

SUNDAY, JUNE 19, 1983

Providing an exotic background for the Craft Fair this year will be a Museum safari exploring the vast continent of Africa with its exotic animals and native traditions. Your Museum membership will be a passport to an adventure including:

- A performance by the Yacouba Mask Dance Company, authentic costumed dancers and musicians from the Ivory Coast.
- Traditional African folktales told by Dr. Harriet Masembe of Uganda.
- The opportunity to work with Museum modelmakers in creating some of the 250,000 leaves needed for our new Okapi habitat display.
- A safari through the Museum in search of African treasures.
- A chance to have your photograph taken in a campsite surrounded by wild animals.
- Crafts and foods from around the world.

Come and enjoy the Craft Fair.

ties today. The wheat has to be picked about 2 weeks before it is ripe and then soaked in water to make it pliable. The complicated weaving and shaping is done with the wet wheat which then retains the design when it dries. Although Ms. Woolley specializes in the English tradition of wheat weaving, she says the art is found almost everywhere that the grain is grown, with each country having its own designs and associated folklore.

Many of the skills demonstrated at the fair, such as sheepshearing, blacksmithing, horseshoeing and roping, are seldom seen in our urban environment and are a source of wonderment to young fairgoers. To touch a live sheep or to forge iron on a blacksmith's anvil is a new and unforgettable experience. Last year our farrier was besieged with requests for shavings and clippings from the horses' hooves to take home as souvenirs; this year he has promised to bring horseshoes for the children to take home.

Fairgoers are encouraged to participate in many of the crafts. For a number of years, Nan Hackett Joe has sent children and adults home from the Craft Fair delighted with their own basketry creations. Nan's baskets go beyond the utilitarian to a creative art form. Simple rushes, reeds and even weeds are incorporated into unique "container-sculptures." The basketry she teaches can be done without any special supplies, and



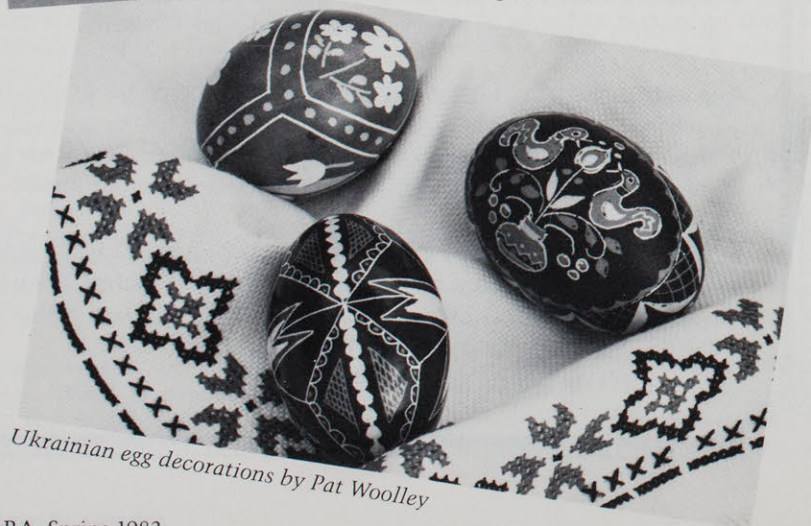
Apple dolls
by John Brooks



Wheat
weavings
by Pat
Woolley



Scrimshaw by Joe Cocke



Ukrainian egg decorations by Pat Woolley

the materials are available in one's own backyard. Nan has conducted classes throughout southern California, and her tapestries and weavings are found in private collections in both the United States and Great Britain. Her works have also been on exhibit locally at the Laguna Beach Museum of Art.

A new face at the Craft Fair this year will be Elaine Katzer, renowned ceramic sculptor. Elaine handbuilds large scale clay sculptures and three dimensional murals with predominantly animal themes. She is also working on a series of smaller sculptures focusing on endangered species.

All of Elaine's works are made using the pinch method of building clay, through which she can achieve hollow, light-weight forms that are structurally strong. Her large sculptures are actually constructed from a number of smaller units that interlock with each other, thus eliminating problems that might be encountered in sculpting and firing large volumes of clay. Elaine combines many different surface techniques on her sculptures including incising, painting and appliquéing, and creates varied visual and textural effects. Many of her works can be seen in the Southland, the most recent including a fountain featuring Pacific marine life sculpted for the Manhattan Village Mall and a mural-fountain of Pegasus created for the Palos Verdes Art Center.

These crafts are just a "sampler" of those that you will see on Sunday, June 19th, when many gifted hands will be demonstrating crafts and skills of the old world and the new. So join us in a celebration of excellence at the eighth annual Craft Fair.

Joan Grasty is a Museum Education Specialist in the Education Division of the Natural History Museum. Formerly School Tours Coordinator, Mrs. Grasty has recently been placed in charge of the Docent Roundtable, which organizes the Annual Craft Fair.

tems are generally composed of myriad varieties of plants and animals, with diversity the rule in any single system. Through scientific inquiry we also know enough about plant physiology and genetics to be able to greatly increase the growth and productivity of many plant species. Using this knowledge we can transform a land area that may support hundreds of species of plants and animals into acreage that will yield a large quantity of a single grain or fiber. However, scientific studies show that such single crop planting quickly destroys the natural soil nutrients, those maintained by the normal diversity of species, and continued crop harvesting can only be sustained through massive applications of nitrogen and phosphate fertilizers. Whether to replace diversity with food crops then becomes a question of social values. Science provides the information; technology provides the mechanisms; society makes the decisions.

A society that understands science and the scientific process and that knows the relationship between science and technology is a society that is prepared to make decisions concerning the use of scientific knowledge for social needs. While our schools will continue to play a central role in this educational process, our museums must step forward and shoulder some of the responsibility. We in museums are in a unique position to provide access to the process of science for peoples of all ages. This is an endeavor in which the Natural History Museum of Los Angeles County must become totally involved.

CURATORS & COLLECTIONS

THE MUSEUM IS CHALLENGED!

The Natural History Museum has been awarded a \$750,000 Challenge Grant from the National Endowment for the Humanities. The grant is one of 84 similar grants, totaling \$26 million, made recently to nonprofit cultural and educational institutions throughout the country. Our award is among the highest offered to support institutions with research and education programs in the humanities.

The Museum's challenge is to raise 3 new dollars for every \$1 granted by NEH—that's \$2.25 million over the next 3 years! The NEH grant and matching funds will be used to support the Museum's history and anthropology programs, with special emphasis on increasing curatorial staff and developing new exhibitions.

As a member of the Natural History Museum Alliance you can help us meet our goal in three ways:

- By renewing your Membership at a higher level,
- By inviting your friends to join the Alliance now,
- And by generously contributing to our special "Meet the Challenge" appeals.

You can call the Alliance Office (213/744-3427) for more information. Won't you help us meet this challenge?

MOVEABLE MUSEUM

Last year more than 70,000 children visited the Natural History Museum on docent-guided school tours. During 1983, the Museum hopes to reach some of the millions who were unable to come. Through a new program known as the "Moveable Museum," trained docent volunteers will bring the resources of the Museum to outlying classrooms and libraries. Illustrated presentations in subjects related to the elementary school curriculum will be offered, and children will be encouraged to touch, observe, and question. The presentations to be offered are tailored to varying age levels and include the following:

- "Dig Those Bones: Discovering Dinosaurs" offers a glimpse into what life was like during the Mesozoic era when dinosaurs ruled the earth. "Hands-on" artifacts include a prehistoric dinosaur bone and a cast of a tooth from the fearsome predator, *Tyrannosaurus rex*.
- "Indian Lore, From the Plains to the Pacific," an exploration of various aspects of Indian culture, is divided into three presentations dealing with California, Southwest, and Plains Indians. Students will have a chance to examine Chumash baskets, shell beads, obsidian arrowheads and other Indian implements.
- "From Tules to Towns: 100 Years of California History" concentrates on the years between 1769 and 1869; it covers the successive periods of missions and ranchos, the Gold Rush and California becoming a state. An adobe brick mold, gold-panning equipment, and a genuine leather dollar will travel with the presentation.

The "Moveable Museum" is available without charge to schools and libraries in the Los Angeles area. Information and reservations may be obtained from the Museum's Education Division, 213/744-3341.

FOSSIL STUDIES FUNDED

Care of Collections Grant

The Vertebrate Paleontology and Rancho

La Brea Sections of the Natural History Museum have been awarded a \$200,000 grant from the National Science Foundation to upgrade preparation and curation of the Museum's world-recognized fossil collections. The major goals of the grant are to prepare and curate the large backlog of Miocene fossil marine vertebrates collected by the Museum over the past decade and to clean, repair and transfer the original Rancho La Brea collections from the Natural History Museum to the Page Museum.

The 3-year grant will fund a Collection Manager and three preparators to enable the Museum to maintain a high level of professional service to the international scientific community. The proposal was a joint effort of the four curators of Vertebrate Paleontology, Drs. William Akersten, Lawrence Barnes, Kenneth Campbell and David Whistler, and George Jefferson of the Page Museum. Dr. Samuel McLeod will serve as the Collection Manager, and Robert L. Clark and James Quinn as Senior Museum Technicians, for this grant.

Laguna Hills

The Vertebrate Paleontology Section was recently awarded a grant from the National Geographic Society to collect and interpret fossils from an important late Miocene site in the Laguna Hills district of Orange County. Dr. Barnes is the Principal Investigator. Working with him are Dr. McLeod and Rodney E. Raschke. The site, known to the Museum staff for over 13 years, has produced hundreds of fossils of sharks, fish, turtles, birds, sea lions, dolphins, and whales but will be destroyed by future highway construction.

During late October and early November, a Museum crew camped at the site and carried out a detailed scientific excavation that produced many hundreds of new specimens, including species not previously represented in the collections. Numerous volunteers from the Vertebrate Paleontology Section assisted in the field as did members of the Natural History Foundation of Orange County. Access to the site was kindly granted by the owners of the property, S and S Construction Company, a subsidiary of Shapell Industries, Inc., of Beverly Hills. Byron L. Crume, Inc., a construction company of Corona, generously donated the services of a tractor and operator to aid in uncovering the bone-producing horizon.

The cleaning, cataloging and analysis of the collection will continue through the summer. The resulting scientific report will provide new information about the animals that lived along the coast of California 10 million years ago, the environmental conditions they lived in, and how their remains accumulated beneath the sea.



Mr. and Mrs. Konrad Schreier with painting by Charles Waterhouse

Anza-Borrego Desert

The National Science Foundation has awarded a grant of more than \$87,000 to the Natural History Museum to support studies and curation of collections of fossils from the Anza-Borrego desert, a fossil-rich badlands area in eastern San Diego County. The specimens, which were recovered from nearly 12,000 feet of sediments over the last 30 years, are now housed in the Museum and in the Imperial Valley College Museum of El Centro. They give evidence that the Anza-Borrego environment of Plio-Pleistocene times (1 to 3.8 million years ago) supported an abundance of grazing, browsing and water-loving animals, a sharp contrast to the present-day desert condition there. At least 115 species of vertebrates were present, and the animal community included large mammals, such as mastodons, camels, horses, sloths and antelopes, as well as many rodents, reptiles and birds.

Dr. Theodore Downs, Chief Curator Emeritus of the Natural History Museum, is the principal investigator for the National Science Foundation grant; his coinvestigators are Dr. John A. White of Idaho State University, G. Davidson Woodard of Sonoma State University, and Dr. George J. Miller of Imperial Valley College. The California Department of Parks and Recreation, which administers the Anza-Borrego site, has over the

years permitted recovery of fossils from the highly eroded sediments. The new grant will assist in the curation, preparation and analysis of the more recently collected specimens, which will provide additional information on the biostratigraphy, biogeography, paleoenvironment and evolutionary history of the vertebrates of the area.

NEW PAINTING IN HISTORY HALL

The first piece of art specifically commissioned by the History Division recently has been added to the collections through the generosity of Mr. and Mrs. Konrad F. Schreier, Jr. The acrylic painting, entitled "The Lancer Family," was done by the official artist of the United States Marine Corps, Lt. Colonel Charles M. Waterhouse, whose 1980 exhibit at the Museum, "Marines in the Conquest of California," drew considerable popular interest. The new painting was acquired through a special fund endowed by Mr. Schreier, a Research Associate in the History Division, and his wife, Nancy B. Schreier, who is also a historian.

The painting depicts a southern California scene in the mid-nineteenth century. An extended family grouping is traveling through the backcountry near Mule Hill in San Diego County, on the

way to a family gathering or celebration. The means of transportation is typical of the period: several men are mounted on horses saddled with Mexican gear, a woman and children ride in the open *carreta*, drawn by oxen, and several others walk alongside the vehicle.

"The Lancer Family" will be on permanent display in the hall of California and Southwest History, 1540-1940. Near where the painting is to be hung are artifacts from the period depicted, as well as dioramas showing the type of scene that the family in the painting would have seen in their time. One diorama shows a Mexican period wedding celebration in the courtyard of a large adobe house; another shows a house party with couples dancing inside the candlelit house. A full-sized replica of a mid-nineteenth century California adobe house contains scores of artifacts used over a century ago by California families; other exhibits contain a brandy still used at Mission San Gabriel, leatherworking tools, clothing, and personal accessories from the time.

THOSE CRAFTY DOCENTS ARE AT IT AGAIN!

Interviewing a sheepshearer, a scrimshander or a net darter is all in a day's work for the docents who organize the Natural History Museum's annual Craft

Fair. Sponsored by the Education Division and aided and abetted by other Museum staff, the docents spend many months working to insure this special event's success. Over 100 docents participate in the Craft Fair in some way, from those who actually plan the day to those who help bring the dream to life.

In June of last year, over 26,000 people enjoyed the results of these labors. The Museum was packed to the rafters and overflowing onto the lawns outside with young and old alike learning many crafts and skills, pursuing the giant condor in the Great Museum Game, and joining the square dancers in a do-si-do.

This year's fair, scheduled for Sunday, June 19th, promises even more excitement. Since last August, Craft Fair Coordinator Florence Hable and Craftsmen Chairman Evie Ryker have spent many hours interviewing prospective craftsmen to obtain the talented 45 who will actually participate. Entertainment Chairman Connie Graham has been a veritable Sherlock Holmes, tracking down African dancers, musicians, storytellers and food merchants to fit in with this year's African safari theme. Babs Levine, Docent Craft Chairman, has been busy marshalling the troops of docents who will make buttons and banners, devise games and costumes, peddle balloons, assist craftsmen, bring exhibits to life and do all those myriad things that make the day so special.

The growing success of the Craft Fair since its inception in 1975 is a tribute to the hard work of the hundreds of dedicated volunteers who have contributed their time, energy, brains and brawn over the last 8 years. Truly the docents have perfected a craft of their own—the craft of giving of themselves.

DOROTHY H. SELIGMAN, 1920 to 1983

Dorothy Halle Seligman, Editor of *TERRA* and its predecessor *MUSEUM QUARTERLY* for the past 17 years (see *TERRA*, Winter 1983) died of cancer on February 2, 1983, at her home in Los Angeles.

Mrs. Seligman had a varied and successful career in publications and public service. In addition to editing the Natural History Museum's members magazine and serving on its Alliance Board, she edited a number of special publications for the Museum, including its 1981 catalog *Sweat of the Sun, Tears of the Moon: Gold and Emerald Treasures of Colombia*. Independently, she also wrote for children and was co-chairman and editor for KCET's Festival of Student Art.

Mrs. Seligman's enthusiasm for the Museum and devotion to her work are evident in the books and magazine issues that she produced.

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